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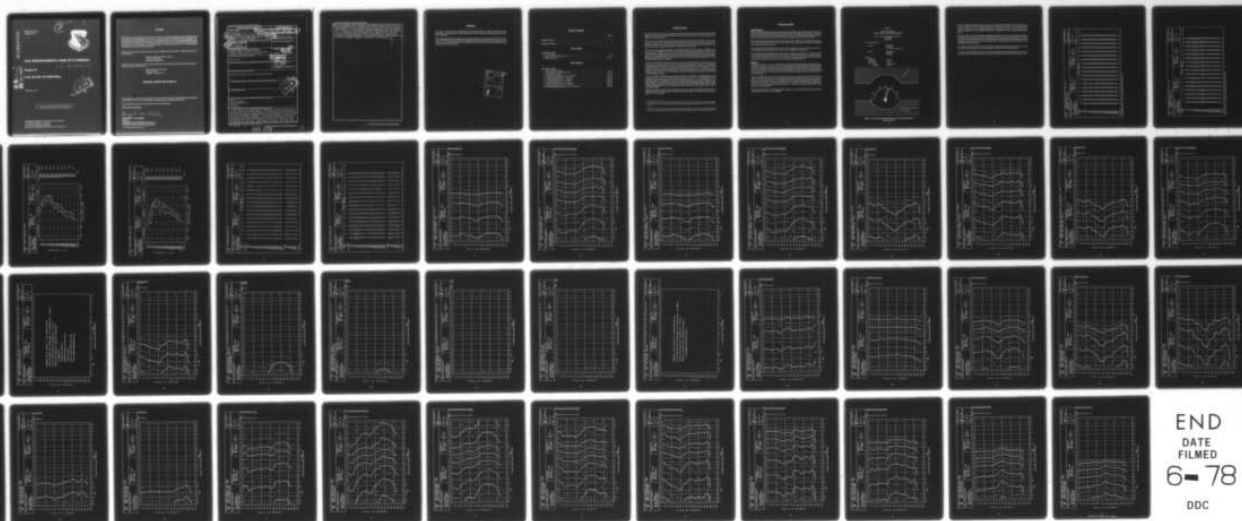
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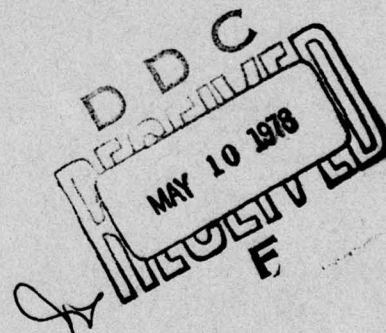


USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK

Volume 76

O-2A Aircraft, Far-Field Noise

FEBRUARY 1977



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AEROSPACE MEDICAL RESEARCH LABORATORY
AEROSPACE MEDICAL DIVISION
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

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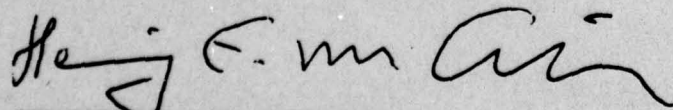
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FOR THE COMMANDER



HENNING E. VON GIERKE

Director

**Biodynamics and Bioengineering Division
Aerospace Medical Research Laboratory**

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band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, "USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application", AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc.

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PREFACE

This report was prepared by the Biodynamic Environment Branch, Aerospace Medical Research Laboratory, under Project/Task 723104, Measurement and Prediction of Noise Environments of Air Force Operations.

The authors gratefully acknowledge Mr. John Cole for his assistance in preparing this report, Mr. Keith Kettler, Mr. Henry Mohlman and Mr. David Eilerman of the University of Dayton for assistance in the mechanics of data processing and Mrs. Norma Peachey and Mr. Mike Patterson for assistance in typing and preparation of the graphics.

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INTRODUCTION

The USAF O-2A is a light cargo and forward air control aircraft powered by two IO-360-D reciprocating engines. The aircraft was manufactured by the Cessna Aircraft Company and the engines by the Teledyne Continental Motors.

This volume provides measured and extrapolated far-field data defining bioacoustic environments produced by this aircraft during ground runup operations. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with ground runups of the O-2A aircraft.

This volume is one of a series published by the Aerospace Medical Research Laboratory (AMRL) under the same number (AMRL-TR-75-50) as a multi-volume handbook that quantifies the noise environments produced at flight/ground crew locations and in surrounding communities by operations of Air Force aircraft and ground support equipment. The far-field, community-type noise data in the handbook describe the noise produced during *ground operations* of aircraft, ground support equipment, and other ground-based equipment or facilities.

Volume 1 of this handbook discusses the objectives and design of the handbook, types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. Volume 2 provides a method and data for adjusting the handbook's far-field noise data, which are for standard meteorological conditions (15 C temperature, 70% rel humidity, 0.760 meters Hg barometric pressure), to derive comparable data for other meteorological conditions. *Refer to Volumes 1 and 2* (references 1 and 2) for such information because it is not repeated in other handbook volumes.

A cumulative index lists those aerospace systems contained in the handbook, and identifies the specific volumes containing each type of environmental noise data available (i.e., inflight/flight crew and passenger noise, near-field/ground crew noise, far-field/community noise). Volume numbers are assigned sequentially as individual volumes are published. This index is periodically updated as individual volumes are published and is available upon request from AMRL/BBE, Wright-Patterson AFB, OH 45433. Organizations on the distribution list for the handbook will automatically receive a copy of each updated index.

Direct any questions concerning the technical data in this report and other handbook volumes to: AMRL/BBE, Wright Patterson AFB, OH 45433; AUTOVON 78-53675 or 78-53664; Commercial (513) 255-3675 or (513) 255-3664.

1. Cole, John N., *USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application*, AMRL-TR-75-50 (1) Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio, 1975.
2. Cole, John N., *USAF Bioenvironmental Noise Data Handbook, Volume 2: Procedure to Evaluate Effects of Non-standard Meteorological Conditions on Far-Field Noise*, AMRL-TR-75-50 (2), AMRL, WPAFB, OH, 1975.

FAR-FIELD NOISE

MEASUREMENTS

AMRL acquired far-field data during a 1-hour test period at Eglin Air Force Base. Figure 1 shows the ground runup pad, ground cover, aircraft orientation and the 19 microphone measurement sites on the semicircle. The center of the 30 meter radius semicircle used in surveying the IO-360-D engines was on the ground directly below a point midway between the engines on the aircraft's centerline.

Table 1 provides cockpit readouts of some engine characteristics (RPM and manifold pressure) for each power setting used in the far-field tests. Also listed in this table are the surface meteorological conditions during data acquisition.

All microphone measurement sites are in the acoustic far-field of the source where the sound wavefronts spherically diverge and the noise source may be regarded as a point source.

Test personnel acquired far-field noise data by using a hand-held microphone (1.7 meters/5-1/2 feet above the ground plane and pointed at the noise source, 0° incidence) and sequentially recording 5 to 10 seconds of data at each far-field location on a portable microphone/tape recorder system. The samples were then time-integrated to derive a root-mean-square sound pressure level.

RESULTS

Table 2 lists the overall and 1/3 octave band SPL measured at the far-field locations under meteorological conditions at the time of the test. Data in all other figures and tables are based on these levels. These data were normalized to 100 meters distance and standard meteorological conditions (15 C temperature, 70% relative humidity, 0.760 meter Hg barometric pressure) and used to derive the graphic data in Figure 2 which provides a compact summary of the far-field noise characteristics of the O-2A aircraft in a standard format.

Figure 3 and Table 3 present two basic acoustic measures, the acoustic power level and the directivity index, respectively. The acoustic power level describes the power radiated by the source as a function of frequency. The directivity index is a standard acoustical engineering measure that describes the geometric way in which the source radiates this power as a function of both frequency and angle from source. These basic source measures are primarily of interest for acoustical engineers and noise generation/control specialists.

Estimates of noise levels for intermediate power conditions (e.g., 1800 engine RPM) can be determined as explained in Volume 1 of this handbook.

TABLE 1
TEST CONDITIONS
FOR FAR-FIELD NOISE MEASUREMENTS

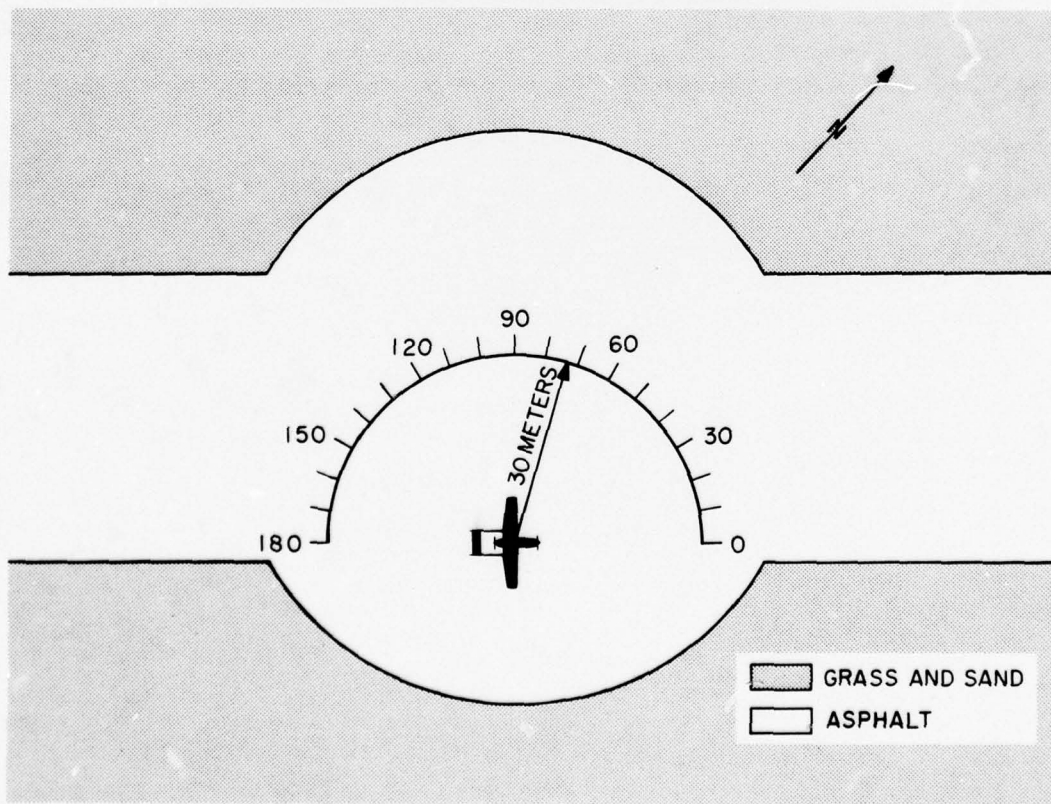
O-2A Aircraft, Ground Runups, Eglin AFB, FL
14 May 1971
Tail # 68-7649

Aircraft Engine Operation

Idle/Taxi	Both Engines 1000 RPM 18 Inches, Manifold Pressure
Military	Both engines 2800 RPM 26" MAP

Meteorology

Temperature	19 C
Ba Pressure	.762 M Hg
Rel Humidity	66 %
Wind — Speed	2.6 M/Sec (5 Kts)
— Direction	340 Deg.



**Figure 1. Far-Field Measurement Locations on Hot Cargo Pad,
Eglin AFB, FL**

Figures 4 through 10 are sets of equal noise contours describing seven different measures of noise as a function of angle and distance from the source for standard day meteorology. They are respectively, overall sound pressure level, C-weighted sound level, A-weighted sound level, perceived noise level, speech interference level, permissible exposure times for personnel and octave band sound pressure levels.

Data excessively influenced by spurious background/electronic noise were eliminated from all figures and tables. No data are presented at the 180 degree location for the idle/taxi power setting and at the 170 and 180 degree locations for the military power setting because of turbulent air flow behind the aircraft. Typically, the A-weighted levels for these angles are 10 to 20 dBA below the level measured at the preceding microphone location.

Test personnel performed noise surveys during quiet periods when the background noise was minimal, e.g., early in the morning when no other aircraft or engine test stands were operating.

Volume 2 of the handbook describes the influence of meteorology on far-field noise environments, and provides, if required, the factors necessary to adjust the handbook's standard meteorological day data.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																			
1/3 OCTAVE BAND																			
DISTANCE = 30 METERS																			
NOISE SOURCE/SUBJECT:																			
(OPERATION:)																			
(IDLE/TAXI POWER)																			
(1000 RPM)																			
(BOTH ENGINES)																			
METEOROLOGY:																			
(TEMP = 19 C)																			
(BAR PRESS = .762 M HG)																			
(REL HUMID = 66 %)																			
PAGE 2																			
IDENTIFICATION:																			
OMEGA 1.4																			
TEST 75-002-039																			
RUN 01																			
0-2A AIRCRAFT																			
IO-360-C/D ENGINE																			
FAR FIELD NOISE																			
FREQ (HZ)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
25	65	64	63	64	62	63	65	61	61	62	61	62	61	59	60	62	65	74	
31.5	74	75	75	75	76	74	74	76	77	76	75	75	76	75	77	76	74	76	
40	69	68	67	68	68	68	68	70	70	70	70	70	70	70	69	73	73	74	
50	75	75	75	75	75	74	75	75	76	76	76	76	76	76	77	78	77	76	
63	79	79	79	79	80	79	79	79	79	78	77	76	77	76	77	75	75	73	
80	74	75	74	75	75	75	77	77	77	77	78	78	79	78	77	75	74	72	
100	81	82	83	83	84	83	82	80	78	79	82	84	84	84	84	83	81	78	
125	75	75	74	76	75	77	77	75	74	74	75	74	75	77	77	76	76	73	
160	78	77	77	78	78	76	76	75	73	73	75	75	76	79	79	79	80	74	
200	73	72	72	73	72	72	71	68	66	66	69	68	69	72	74	75	77	70	
250	69	70	69	70	69	67	67	64	61	61	65	66	66	69	69	70	74	66	
315	70	70	68	69	71	65	65	63	62	63	63	64	68	66	69	71	70	62	
400	75	74	73	73	74	69	68	67	65	64	68	68	72	71	73	75	74	66	
500	72	72	71	71	71	69	66	66	62	60	65	65	70	70	70	73	74	66	
630	67	68	64	65	65	63	60	61	60	59	59	61	64	65	62	65	66	61	
800	68	66	66	66	66	62	61	62	59	58	61	62	65	64	63	66	64	59	
1000	69	68	67	67	65	64	62	62	60	59	62	64	65	67	65	64	63	60	
1250	64	63	63	65	63	60	60	60	58	59	59	60	63	64	63	62	63	57	
1600	62	61	60	61	60	59	57	58	57	57	58	58	61	60	61	61	63	55	
2000	58	57	58	59	58	57	56	56	54	54	55	56	58	59	58	59	60	54	
2500	55	55	56	57	57	56	55	54	54	55	55	56	57	57	59	59	59	53	
3150	55	54	56	56	56	55	54	55	55	56	57	58	58	58	56	58	57	53	
4000	54	54	53	54	54	54	52	54	53	56	56	57	58	59	54	57	56	52	
5000	53	54	54	55	55	54	53	54	54	54	55	55	57	57	58	60	59	57	
6300	51	51	52	52	52	52	52	51	52	52	53	55	55	55	55	56	56	50	
8000	51	50	51	51	51	51	50	51	51	50	51	51	52	54	54	56	54	49	
10000	49	50	50	50	50	50	50	49	50	49	50	51	52	52	52	54	53	47	
OVERALL	87	87	87	87	88	87	87	86	85	85	87	87	87	88	88	88	87	85	
LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.																			

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																
1/3 OCTAVE BAND																
DISTANCE = 30 METERS																
NOISE SOURCE/SUBJECT:																
(OPERATION:)																
(MILITARY POWER)																
(2800 RPM)																
(BOTH ENGINES)																
(FAR FIELD NOISE)																
METEOROLOGY: 19 C																
TEMP = 19 C																
BAR PRESS = .762 M HG																
REL HUMID = 66 %																
IDENTIFICATION:																
OMEGA 1.4																
TEST 75-002-039																
RUN 02																
08 MAY 75																
PAGE 2																
FREQ (HZ)																
ANGLE (DEGREES)																
70 80 90 100 110 120 130 140 150 160 170 180																
25	80	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89
31.5	78	79	77	78	79	80	81	82	83	84	85	86	87	88	89	90
40	79	79	78	79	80	81	82	83	84	85	86	87	88	89	90	91
50	79	78	78	79	80	81	82	83	84	85	86	87	88	89	90	91
63	82	81	83	86	88	89	91	92	93	94	95	96	97	98	99	100
80	92	89	93	96	98	100	102	104	106	108	110	112	114	116	118	120
100	97	95	98	101	103	105	107	109	111	113	115	117	119	121	123	125
125	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
160	98	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110
200	105	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104
250	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
315	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
400	105	104	103	100	98	96	94	92	90	88	86	84	82	80	78	76
500	102	102	100	99	99	99	99	99	99	99	99	99	99	99	99	99
630	95	94	94	93	91	90	88	86	84	82	80	78	76	74	72	70
800	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
1000	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
1250	93	94	93	93	92	91	90	89	88	87	86	85	84	83	82	81
1600	90	92	91	93	91	92	91	90	89	88	87	86	85	84	83	82
2000	88	90	90	91	90	91	90	89	88	87	86	85	84	83	82	81
2500	86	87	87	88	89	90	88	86	84	82	80	78	76	74	72	70
3150	86	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87
4000	85	86	85	86	86	86	86	86	86	86	86	86	86	86	86	86
5000	83	84	84	85	84	85	84	83	82	81	80	79	78	77	76	75
6300	81	81	82	82	82	83	83	83	83	83	83	83	83	83	83	83
8000	79	80	80	81	81	82	82	82	82	82	82	82	82	82	82	82
10000	78	79	79	79	80	81	81	81	81	81	81	81	81	81	81	81
OVERALL	111	110	109	109	110	110	110	112	114	116	116	116	115	115	111	111

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

(FIGURE 1 NORMALIZED FARFIELD NOISE LEVELS
 (2 DISTANCE = 100 METERS
 (NOISE SOURCE/SUBJECT:
 (O-2A AIRCRAFT
 (IO-360-C/O ENGINE
 (FAR FIELD NOISE
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 75-002-039
 (RUN 01
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (08 MAY 75
 (PAGE 6

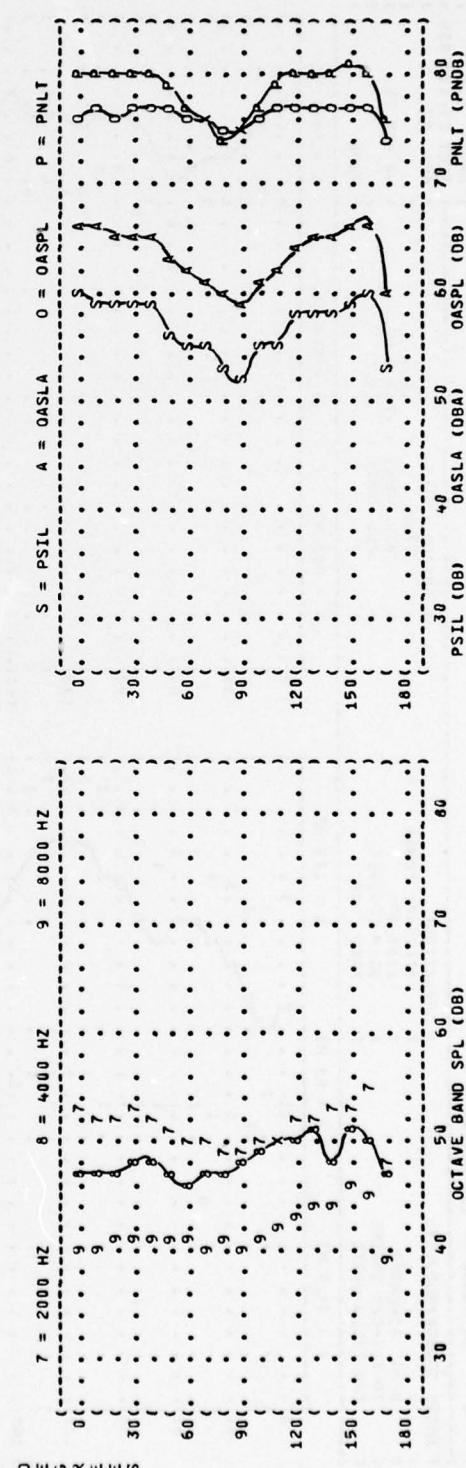
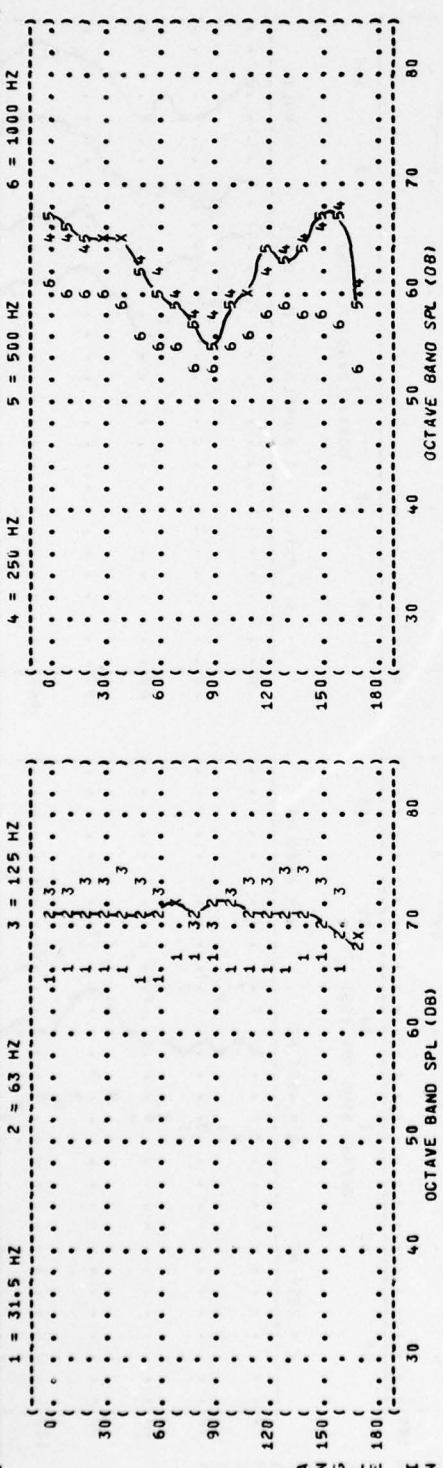


FIGURE: ACOUSTIC POWER LEVEL (PWL)

3

IDENTIFICATION: OMEGA 1.4
TEST 75-002-039
RUN 02

NOISE SOURCE/SUBJECT: OPERATION: MILITARY POWER
O-2A AIRCRAFT 2800 RPM
IO-360-C/D ENGINE BOTH ENGINES
FAR FIELD NOISE

METEOROLOGY: TEMP = 19 C
BAR PRESS = .762 M HG
REL HUMID = 66 %

08 MAY 75
PAGE 3

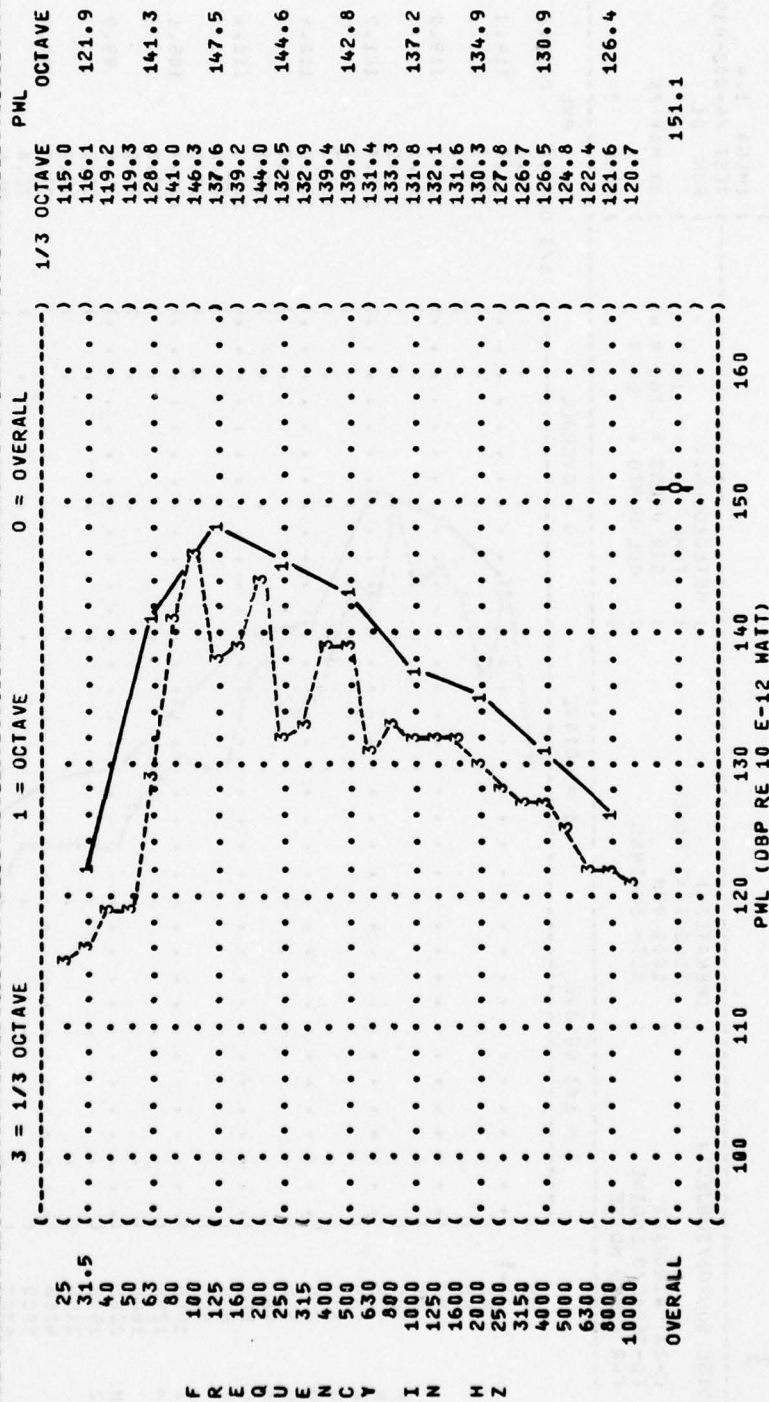
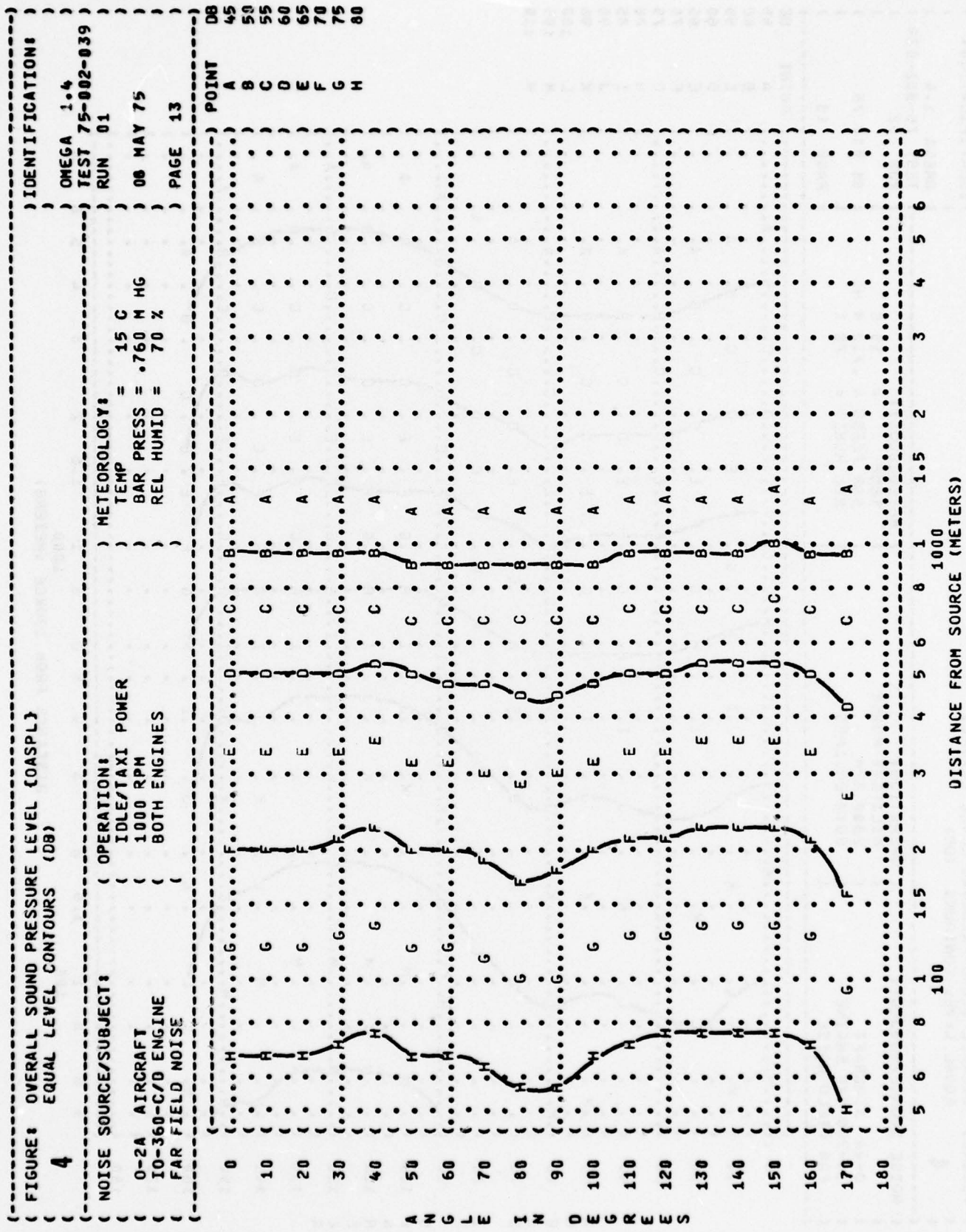
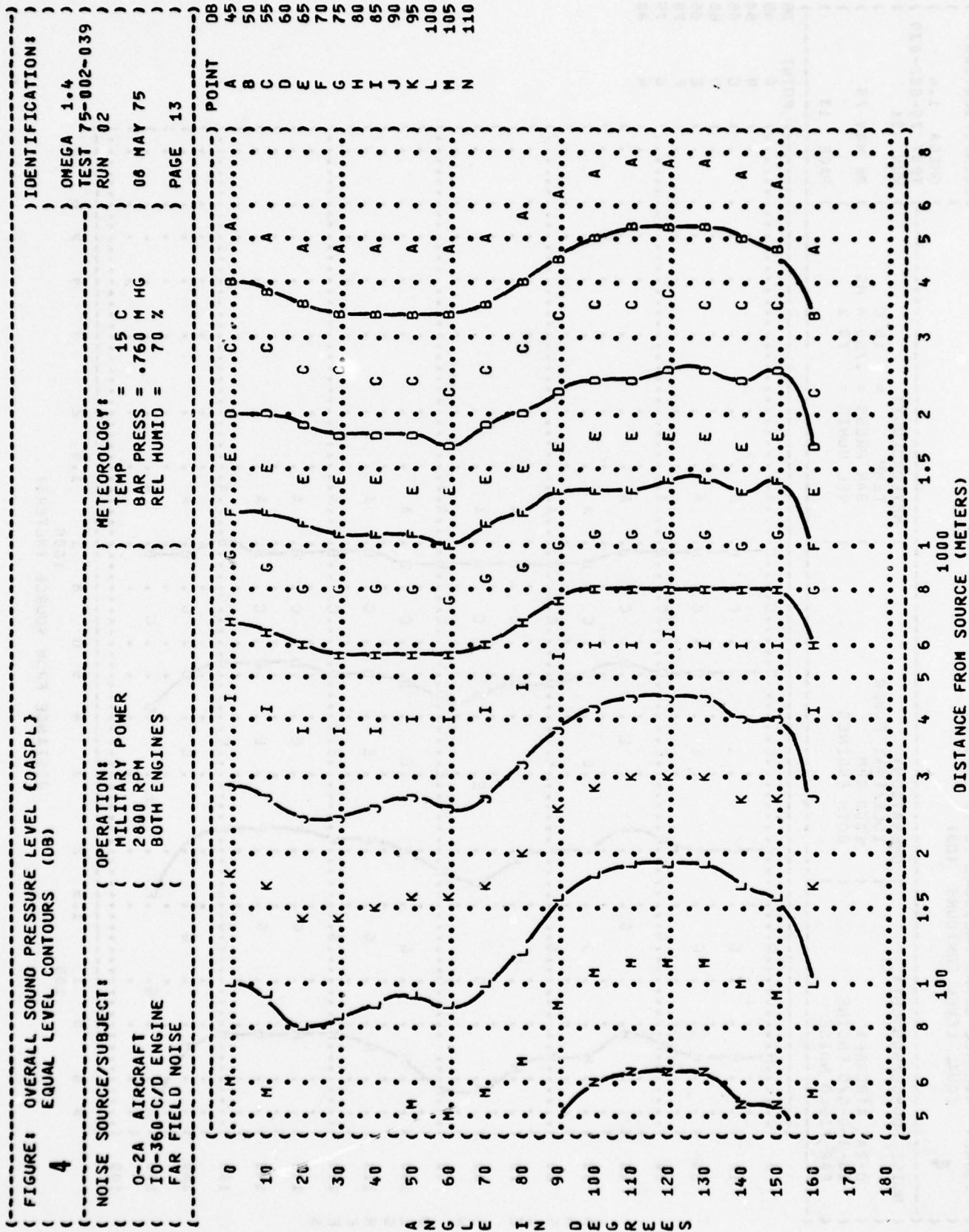
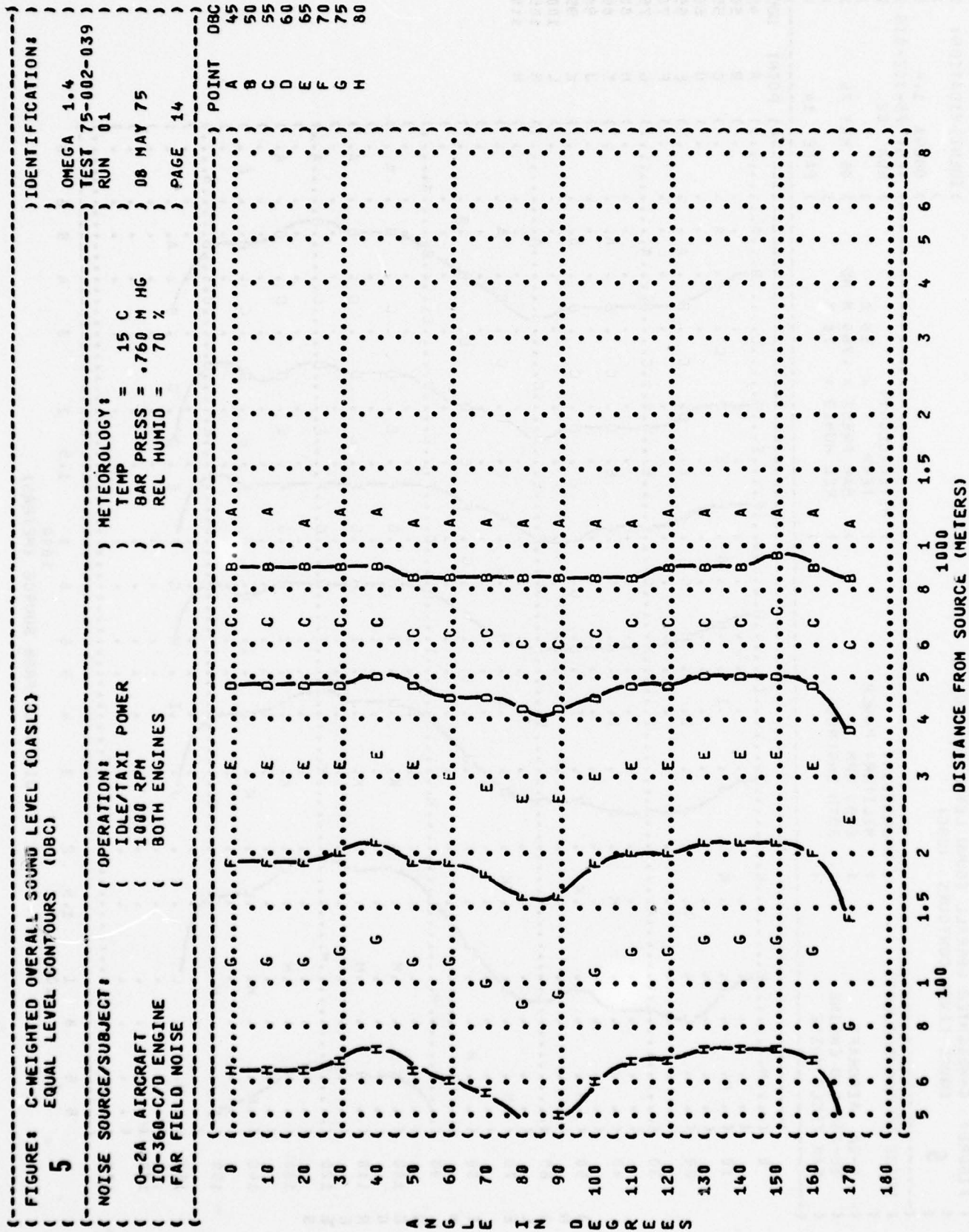


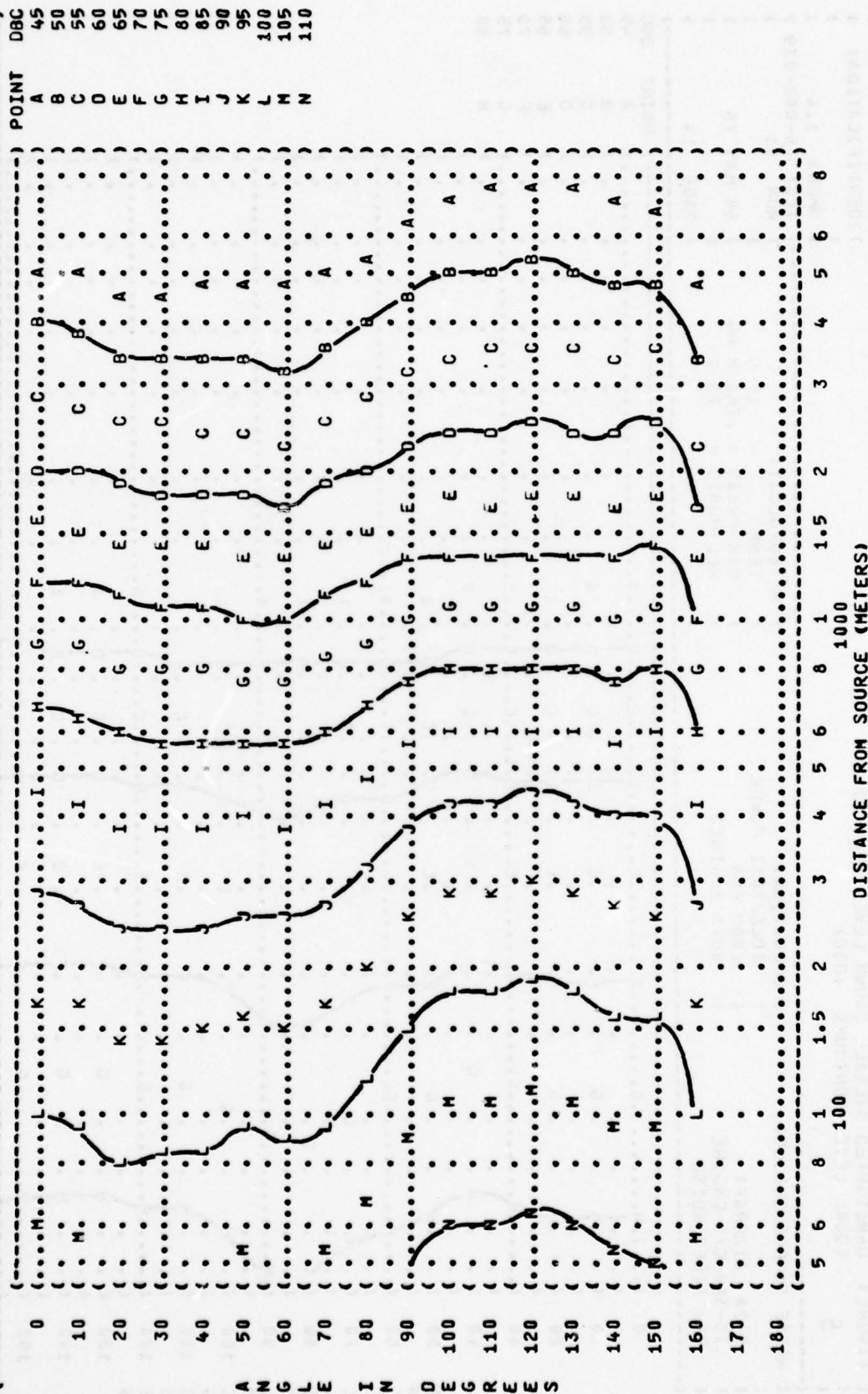
TABLE: DIRECTIVITY INDEX (DB)										IDENTIFICATION:									
3										OMEGA 1.4									
NOISE SOURCE/SUBJECT:										TEST 75-002-039									
(OPERATION:										RUN 02									
(MILITARY POWER										TEMP = 19 C									
(2800 RPM										BAR PRESS = .762 M HG									
(BOTH ENGINES										08 MAY 75									
(O-2A AIRCRAFT										REL HUMID = 66 %									
(IO-360-C/O ENGINE										PAGE 4									
(FAR FIELD NOISE																			
FREQ	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
(HZ)																			
1/3 OCTAVE																			
25	2	3	-3	-1	-1	-1	-1	0	-0	-1	-1	2	2	1	1	1	1	-2	
31.5	-1	1	-2	-1	-1	-1	-0	-1	-0	-2	-2	2	1	2	2	2	1	-2	
40	-3	-3	-4	-3	-2	-1	-1	-2	-1	-1	-2	2	2	2	3	1	0		
50	-3	-4	-4	-3	-2	-1	-1	-1	-1	-1	-1	3	3	2	1	-0	-4		
63	-10	-10	-8	-5	-3	-2	-4	-6	-3	-0	0	4	4	3	3	-0	-5		
80	-12	-14	-11	-8	-6	-4	-4	-4	-4	-3	1	3	3	3	2	-1	-5		
100	-12	-14	-11	-8	-6	-4	-4	-4	-4	-3	1	3	3	3	4	4	2		
125	-3	-4	-4	-4	-4	-3	-4	-4	-2	1	2	3	3	2	1	1	-2		
160	-4	-4	-6	-5	-4	-3	-4	-4	-2	1	2	3	3	2	1	1	1	-2	
200	-2	-3	-7	-5	-5	-4	-5	-4	-2	1	3	3	3	-0	-0	1	4		
250	0	3	0	0	-2	-3	-4	-4	-1	2	0	0	-2	2	2	1	2		
315	2	3	1	-1	-2	-4	-3	-1	-0	1	2	0	0	0	1	4	0		
400	3	2	1	-2	-3	-4	-5	-2	0	1	3	0	0	0	1	4	-2		
500	0	0	-3	-3	-3	-3	-5	-2	0	1	0	1	3	2	2	2	-7		
630	1	0	-0	-0	-1	-3	-4	-2	0	1	3	-0	-1	-0	-0	4	0		
800	-1	-1	-0	-1	-1	-3	-4	-2	-4	3	3	0	-2	0	1	4	-5		
1000	1	0	0	1	-1	-2	-2	-2	-2	1	0	0	1	2	0	3	-5		
1250	-2	-1	-2	-1	-1	-3	-2	-0	-1	0	2	1	2	1	-1	2	-5		
1600	-4	-2	-3	-1	-3	-2	-3	1	2	2	1	1	2	0	-1	-1	-6		
2000	-4	-3	-3	-2	-2	-2	-3	1	1	3	2	1	1	-1	-1	-1	-6		
2500	-4	-3	-2	-2	-2	-2	-2	-2	1	4	1	0	0	0	-0	0	-5		
3150	-3	-2	-2	-2	-2	-2	-2	-1	2	2	1	0	-0	0	-0	-1	-6		
4000	-4	-3	-3	-2	-3	-2	-1	-1	1	3	3	1	0	-1	-1	-1	-2		
5000	-3	-3	-3	-2	-3	-1	-2	-0	1	4	1	0	0	-1	-1	-2	-7		
6300	-3	-3	-2	-2	-2	-1	-1	-1	1	3	2	1	1	0	-1	-2	-6		
8000	-4	-3	-2	-2	-2	-0	-1	-1	0	3	2	-0	1	-1	-1	-1	-6		
10000	-3	-2	-2	-2	-2	-1	-0	-1	1	2	2	0	1	-0	-0	-1	-5		
OCTAVE																			
31.5	-1	-0	-3	-2	-2	-1	-1	-1	-1	-1	-2	2	2	2	2	1	-1		
63	-12	-14	-11	-7	-6	-4	-3	-5	-3	-0	1	4	4	3	3	-0	-5		
125	-8	-9	-9	-7	-6	-4	-4	-4	-3	0	2	3	3	3	2	0	-3		
250	-2	-2	-5	-4	-5	-4	-5	-4	-2	1	3	3	3	2	-0	1	-2		
500	2	1	-1	-2	-2	-3	-5	-2	0	1	2	1	1	2	2	3	-3		
1000	-1	-0	-1	-0	-2	-3	-3	-1	-2	2	2	0	0	1	0	3	-5		
2000	-4	-2	-3	-2	-2	-2	-3	1	1	3	2	1	1	-0	-1	-1	-6		
4000	-3	-2	-3	-2	-2	-2	-2	-2	1	3	2	0	0	-1	-1	-2	-6		
8000	-3	-3	-2	-2	-2	-0	-1	-1	0	3	2	-0	1	-1	-1	-1	-6		
OVERALL	-3	-3	-5	-5	-4	-4	-4	-3	-2	1	2	3	3	2	1	1	-3		

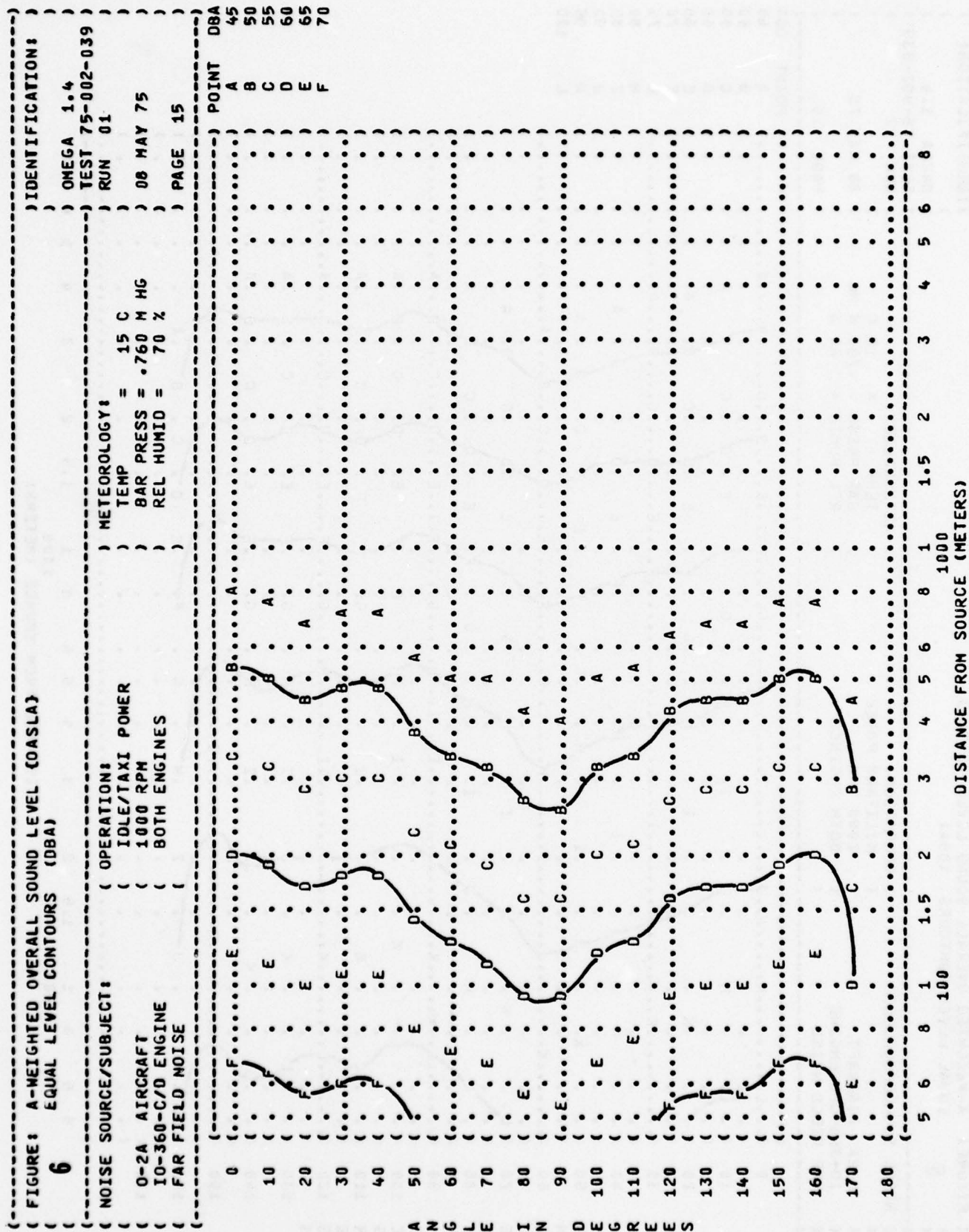




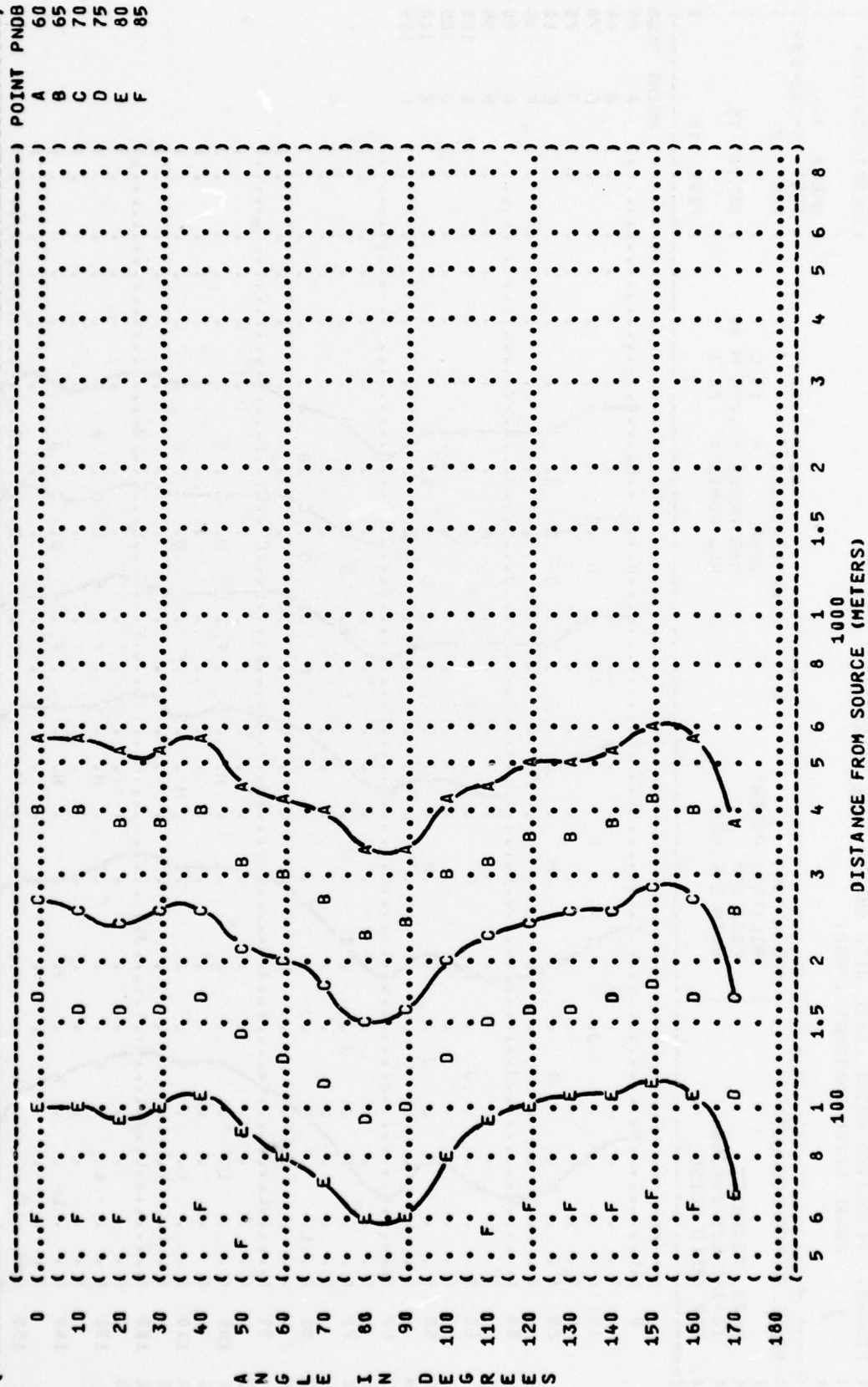



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(-----)
( FIGURE# C-WEIGHTED OVERALL SOUND LEVEL {OASLC} ) IDENTIFICATION: )
(      EQUAL LEVEL CONTOURS {DBC}           )    ) OMEGA   1.4     )
(          5                                ) TEST 75-002-039 )
(-----)
( NOISE SOURCE/SUBJECT:              ) METEOROLOGY: )
(                                     ) TEMP       = 15 C )
( ( MILITARY POWER                   ) BAR PRESS = .760 M HG )
( ( 2800 RPM                         ) REL HUMID = 70 % )
( ( BOTH ENGINES                    )                               )
( ( FAR FIELD NOISE                 ) PAGE 14 )
(-----)
```





(FIGURE: PERCEIVED NOISE LEVEL WITH SMOOTH TONE CORRECTION {PNLT}
 (7
 () IDENTIFICATION:)
 () OMEGA 1.4
 () TEST 75-002-039
 () RUN 01
 ()
 (NOISE SOURCE/SUBJECT:) METEOROLOGY:)
 () OPERATION:)
 () IDLE/TAXI POWER)
 () 1000 RPM)
 () 10-360-C/D ENGINE)
 () BOTH ENGINES)
 () FAR FIELD NOISE)
 ()
 () TEMP = 15 C)
 () BAR PRESS = .760 M HG)
 () REL HUMID = 70 %)
 ()
 () PAGE 16)



```
(-----)
( ) FIGURE: PERCEIVED NOISE LEVEL WITH SMOOTH TONE CORRECTION {PNLT} ) IDENTIFICATION: )
( ) EQUAL LEVEL CONTOURS (PNDB) ) )
( ) 7 ) OMEGA 1.4 )
(-----)
( ) NOISE SOURCE/SUBJECT: ) METEOROLOGY: ) TEST 75-002-039 )
( ) ) ) RUN 02 )
( ) ( OPERATION: ) ) )
( ) ( MILITARY POWER ) TEMP = 15 C ) )
( ) ( 2800 RPM ) BAR PRESS = .760 M HG ) )
( ) ( BOTH ENGINES ) REL HUMID = 70 % ) )
( ) ( ) ) PAGE 16 )
(-----)
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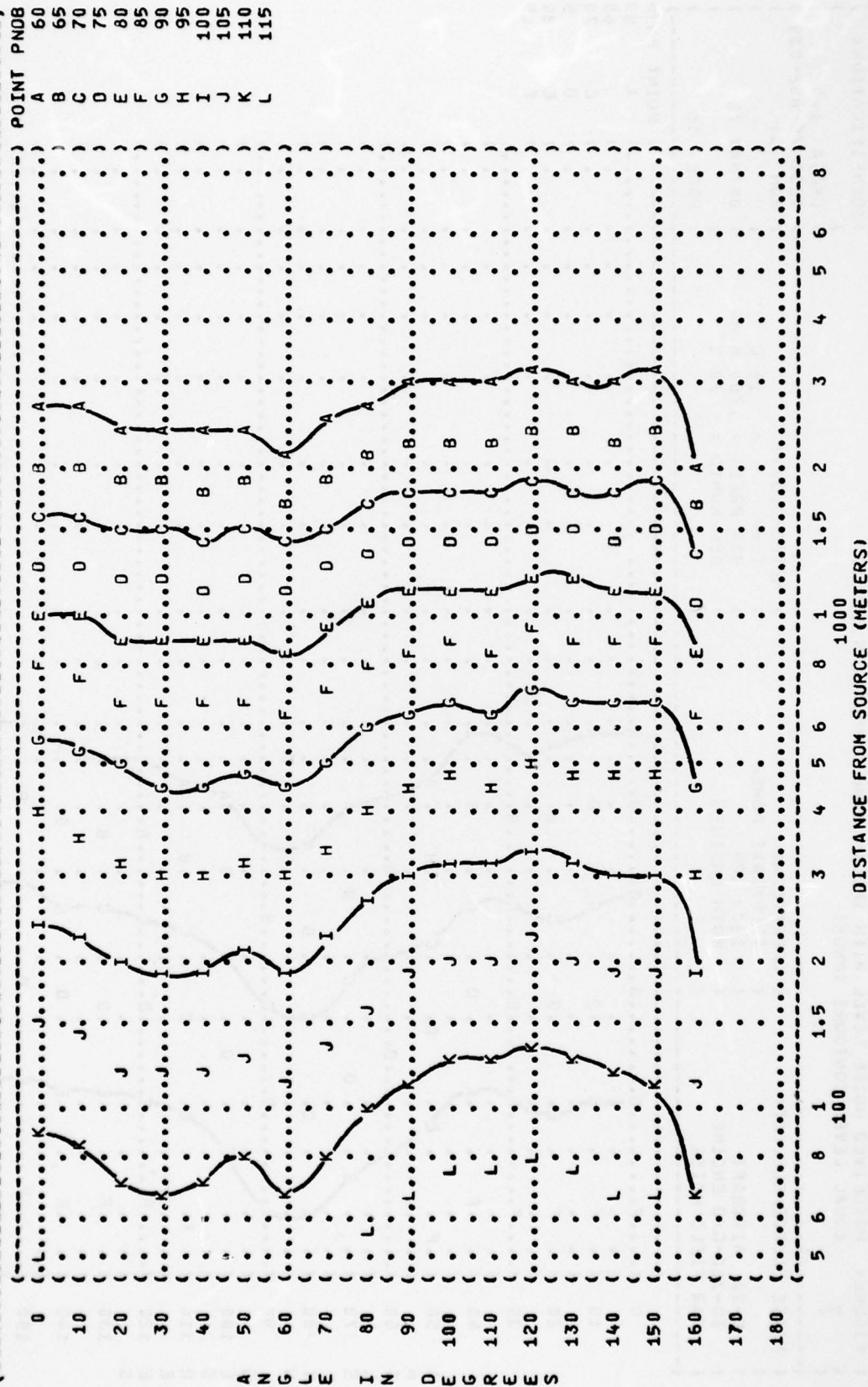


FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)

9

IDENTIFICATION:

OMEGA 1.4

TEST 75-002-039

RUN 01

08 MAY 75

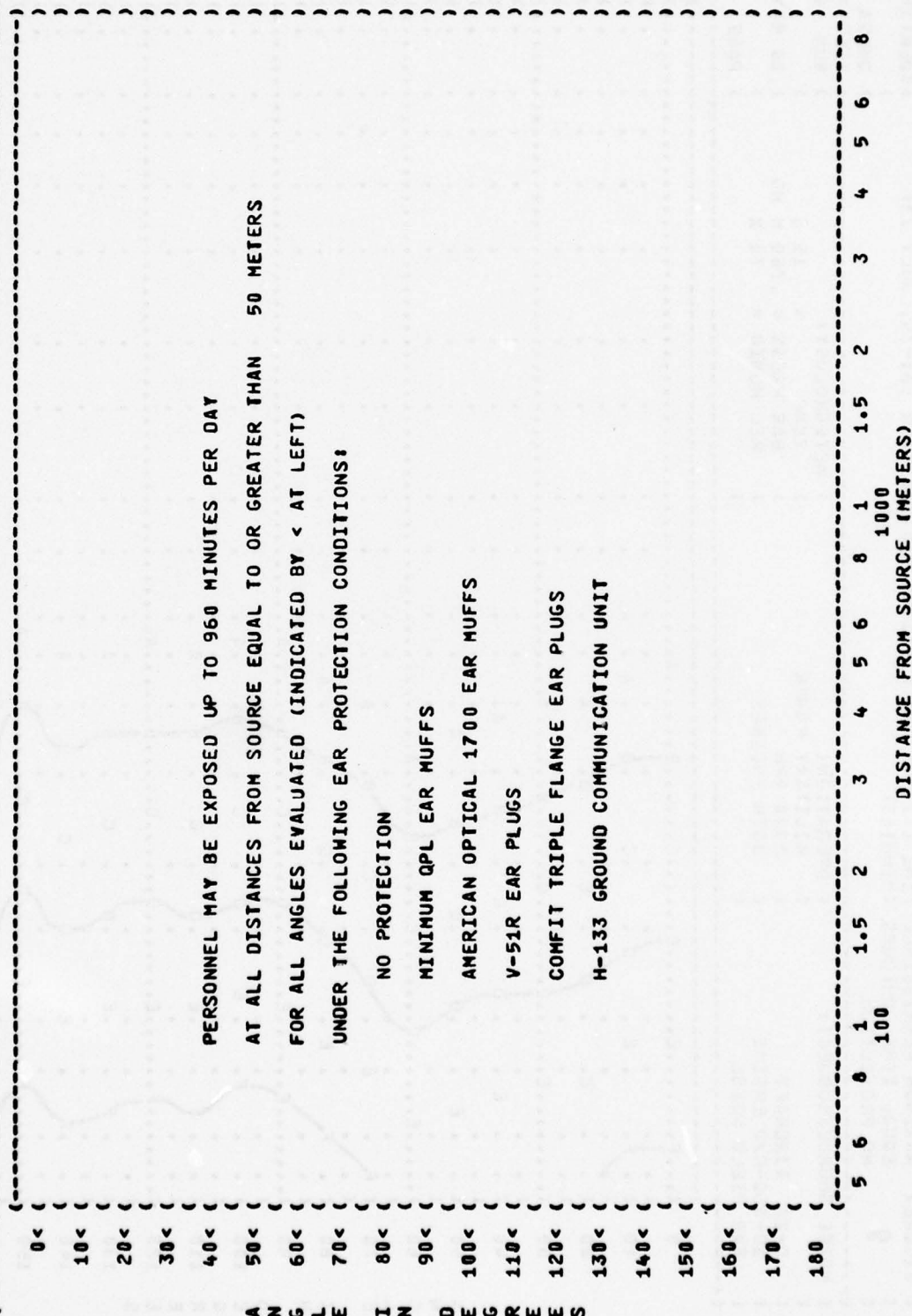
PAGE 7

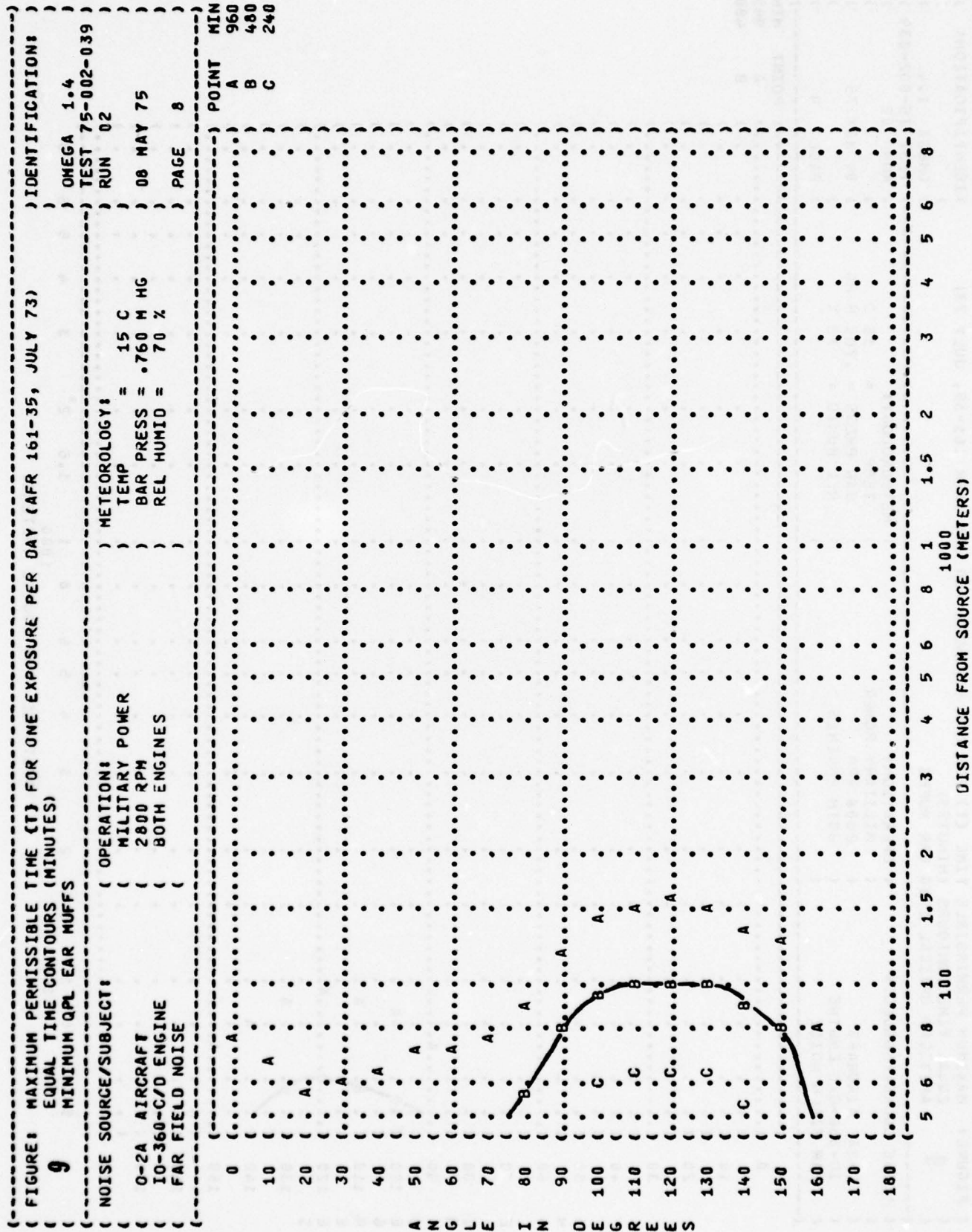
NOISE SOURCE/SUBJECT: OPERATIONS: METEOROLOGY:

0-2A AIRCRAFT IDLE/TAXI POWER TEMP = 15 C

10-360-C/D ENGINE 1000 RPM BAR PRESS = .760 M HG

FAR FIELD NOISE BOTH ENGINES REL HUMID = 70 %





ANGL IN DEGREES

DISTANCE FROM SOURCE (METERS)

FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)

IDENTIFICATION:

OMEGA 1.4

TEST 75-002-039

RUN 02

00 MAY 75

PAGE 12

NOISE SOURCE/SUBJECT:

OPERATION:

MILITARY POWER

2800 RPM

BOTH ENGINES

0-2A AIRCRAFT

IO-360-C/O ENGINE

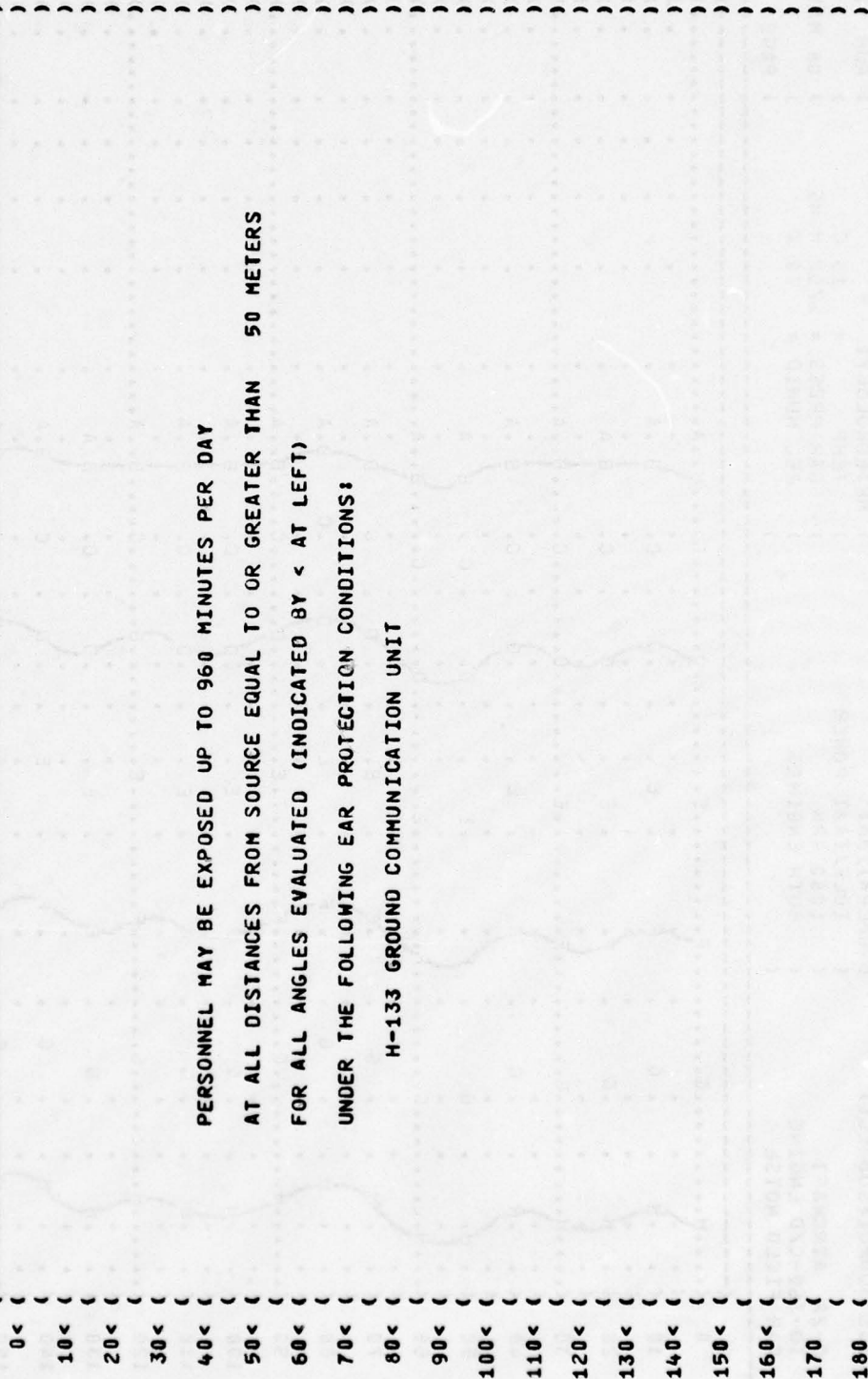
FAR FIELD NOISE

METEOROLOGY:

TEMP = 15 C

BAR PRESS = .760 M HG

REL HUMID = 70 %



PERSONNEL MAY BE EXPOSED UP TO 960 MINUTES PER DAY

AT ALL DISTANCES FROM SOURCE EQUAL TO OR GREATER THAN 50 METERS

FOR ALL ANGLES EVALUATED (INDICATED BY < AT LEFT)

UNDER THE FOLLOWING EAR PROTECTION CONDITIONS:

H-133 GROUND COMMUNICATION UNIT

DISTANCE FROM SOURCE (METERS)

(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (31.5 HZ OCTAVE BAND
 (10
 (NOISE SOURCE/SUBJECT:
 ((OPERATION:
 ((IDLE/TAXI POWER
 ((1000 RPM
 ((90TH ENGINES
 ((0-2A AIRCRAFT
 ((10-360-C/D ENGINE
 ((FAR FIELD NOISE
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 75-002-039
 (RUN 01
 (08 MAY 75
 (PAGE 18

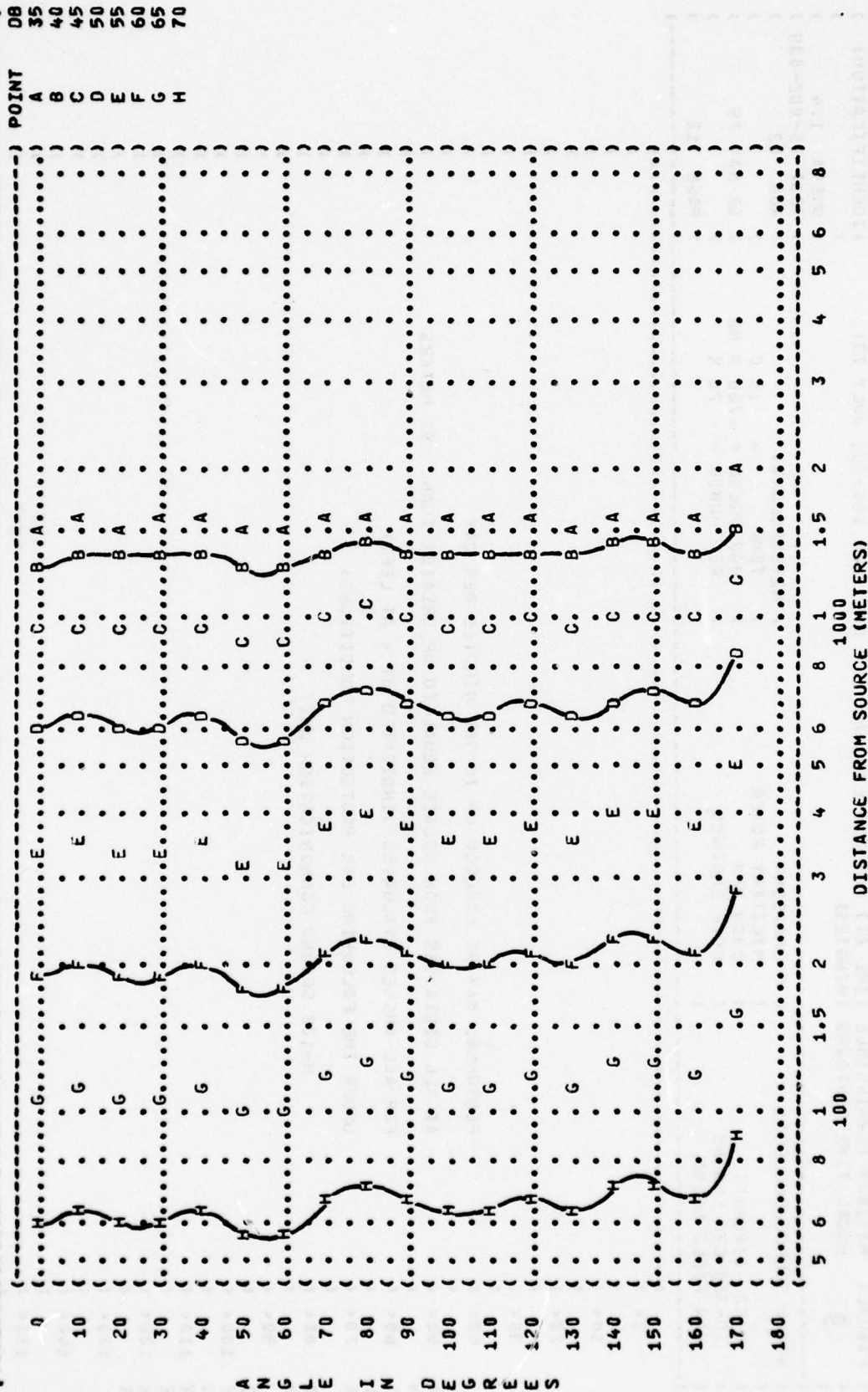


FIGURE: SOUND PRESSURE LEVEL (SPL)
 EQUAL LEVEL CONTOURS (DB)
 10
 63 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT: () OPERATION: () METEOROLOGY: () IDENTIFICATION: ()
 () O-2A AIRCRAFT () IDLE/TAXI POWER () TEMP = 15 C () OMEGA 1.4
 () 10-360-C/D ENGINE () 1000 RPM () BAR PRESS = .760 M HG () TEST 75-002-039
 () FAR FIELD NOISE () BOTH ENGINES () REL HUMID = 70 % () RUN 01
 () () () () 06 MAY 75 ()
 () () () () PAGE 19 ()

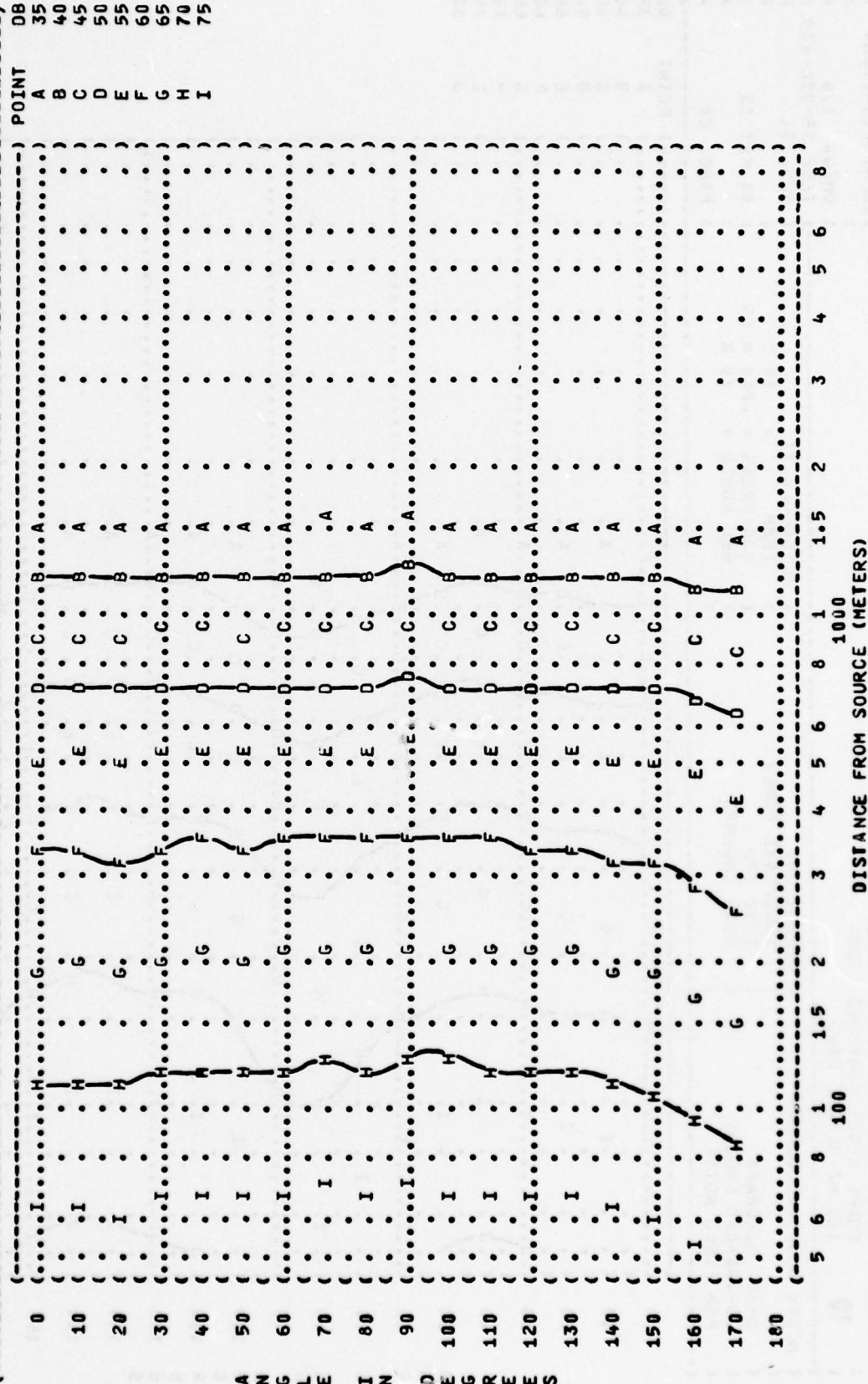


FIGURE: SOUND PRESSURE LEVEL (SPL)
 EQUAL LEVEL CONTOURS (DB)
 125 HZ OCTAVE BAND

10

NOISE SOURCE/SUBJECT: () IDENTIFICATION: ()
 () ()
 () OMEGA 1.4
 () TEST 75-002-039
 () RUN 01

OPERATION: () METEOROLOGY: ()
 () IDLE/TAXI POWER () TEMP = 15 C
 () 1000 RPM () BAR PRESS = .760 M HG
 () BOTH ENGINES () REL HUMID = 70 %

O-2A AIRCRAFT
 IO-360-C/D ENGINE
 FAR FIELD NOISE () PAGE 20

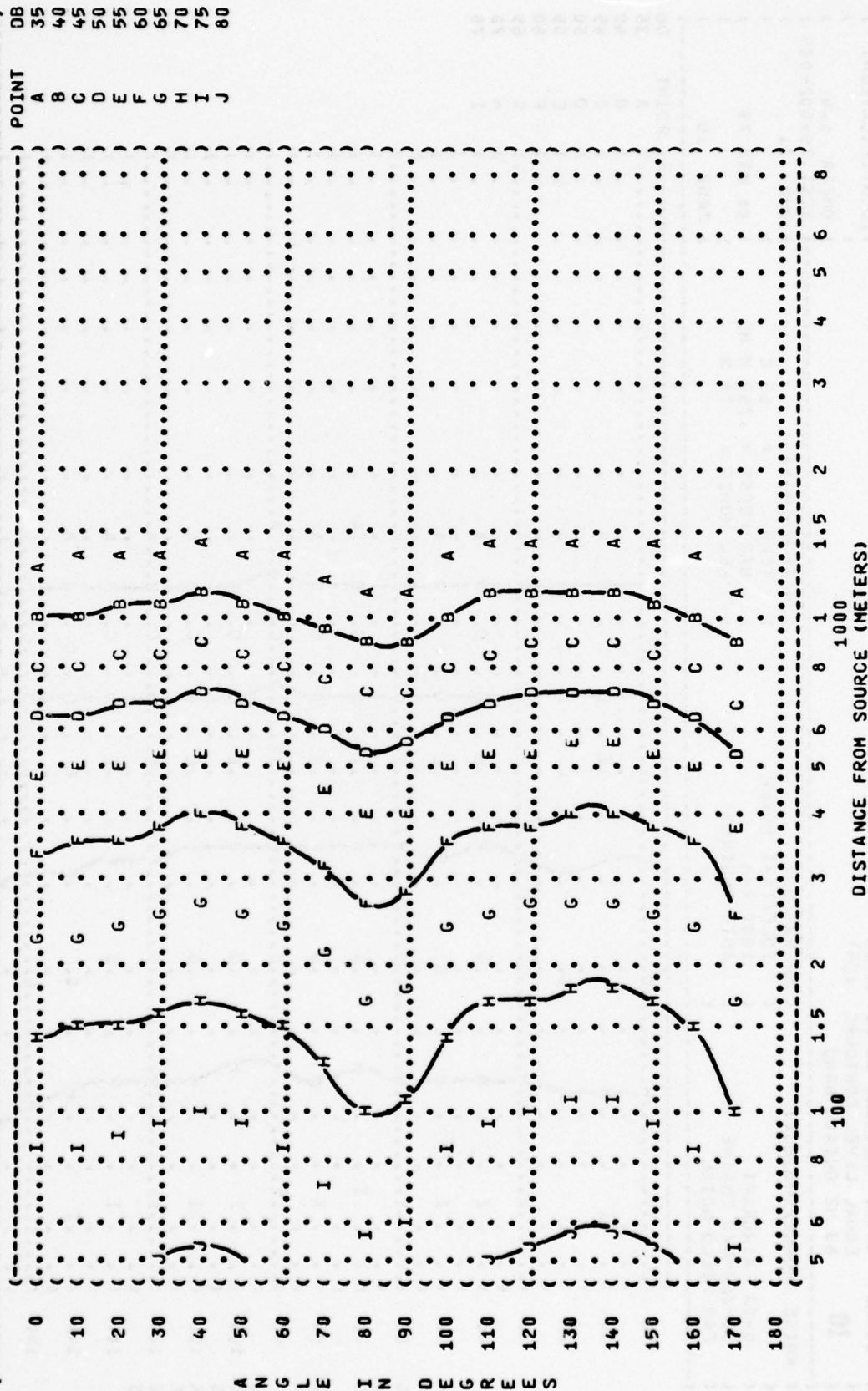


FIGURE: SOUND PRESSURE LEVEL (SPL)
 EQUAL LEVEL CONTOURS (DB)
 10 250 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT: () OPERATION: () METEOROLOGY: ()
 () IDLE/TAXI POWER () TEMP = 15 C
 () 1000 RPM () BAR PRESS = .760 M HG
 () BOTH ENGINES () REL HUMID = 70 %
 () 0-2A AIRCRAFT () PAGE 21
 () 10-360-C/D ENGINE
 () FAR FIELD NOISE

IDENTIFICATION:
 OMEGA 1.4
 TEST 75-002-039
 RUN 01
 08 MAY 75

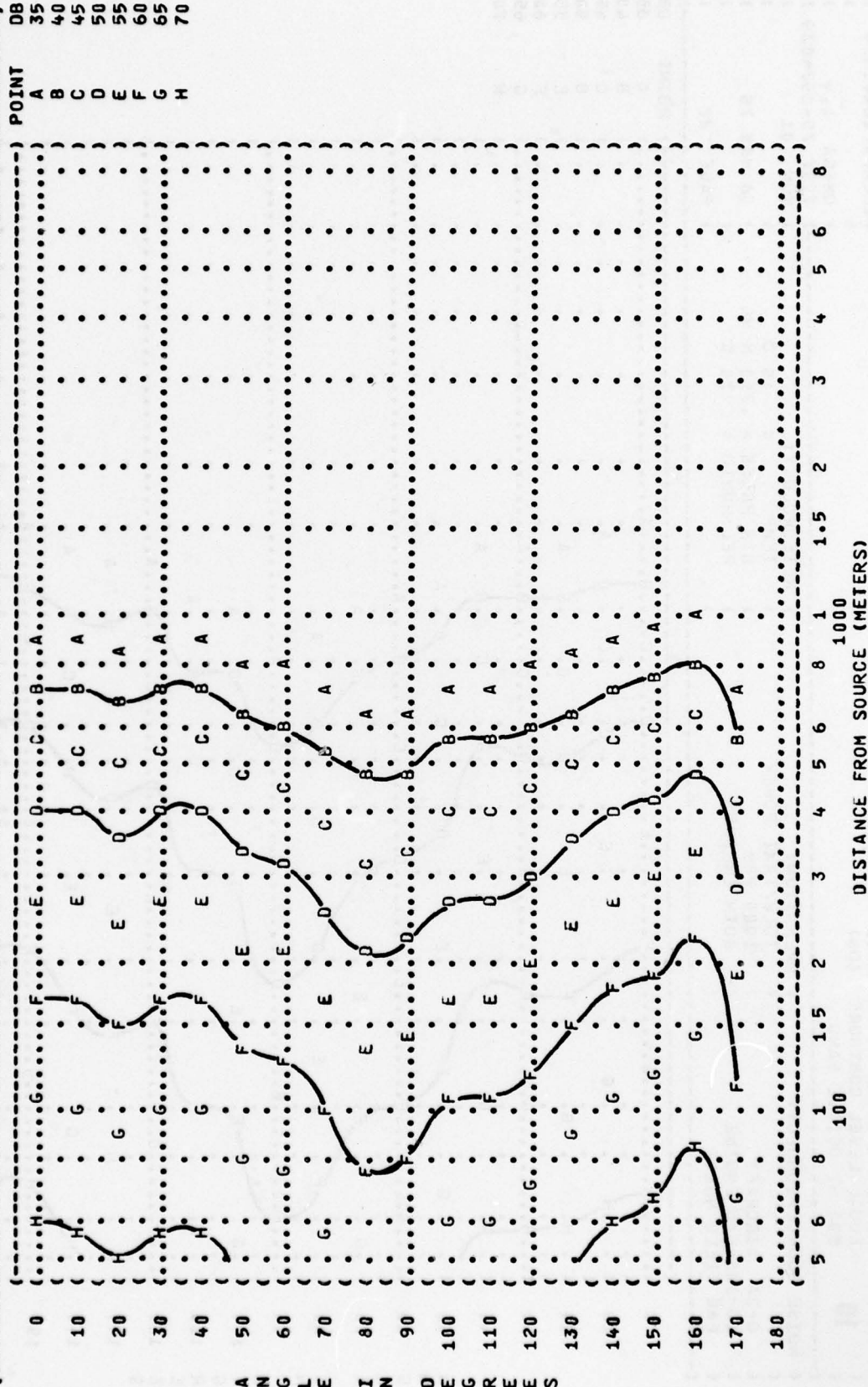


FIGURE: SOUND PRESSURE LEVEL (SPL)
 10 EQUAL LEVEL CONTOURS (DB)
 500 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT: () OPERATION: () IDLE/TAXI POWER () METEOROLOGY: () TEMP = 15 C () BAR PRESS = .760 M HG () REL HUMID = 70 % ()

0-2A AIRCRAFT () 1000 RPM () 08 MAY 75 ()

IO-360-C/O ENGINE () BOTH ENGINES ()

FAR FIELD NOISE ()

IDENTIFICATION: () OMEGA 1.4 () TEST 75-002-039 () RUN 01 () PAGE 22 ()

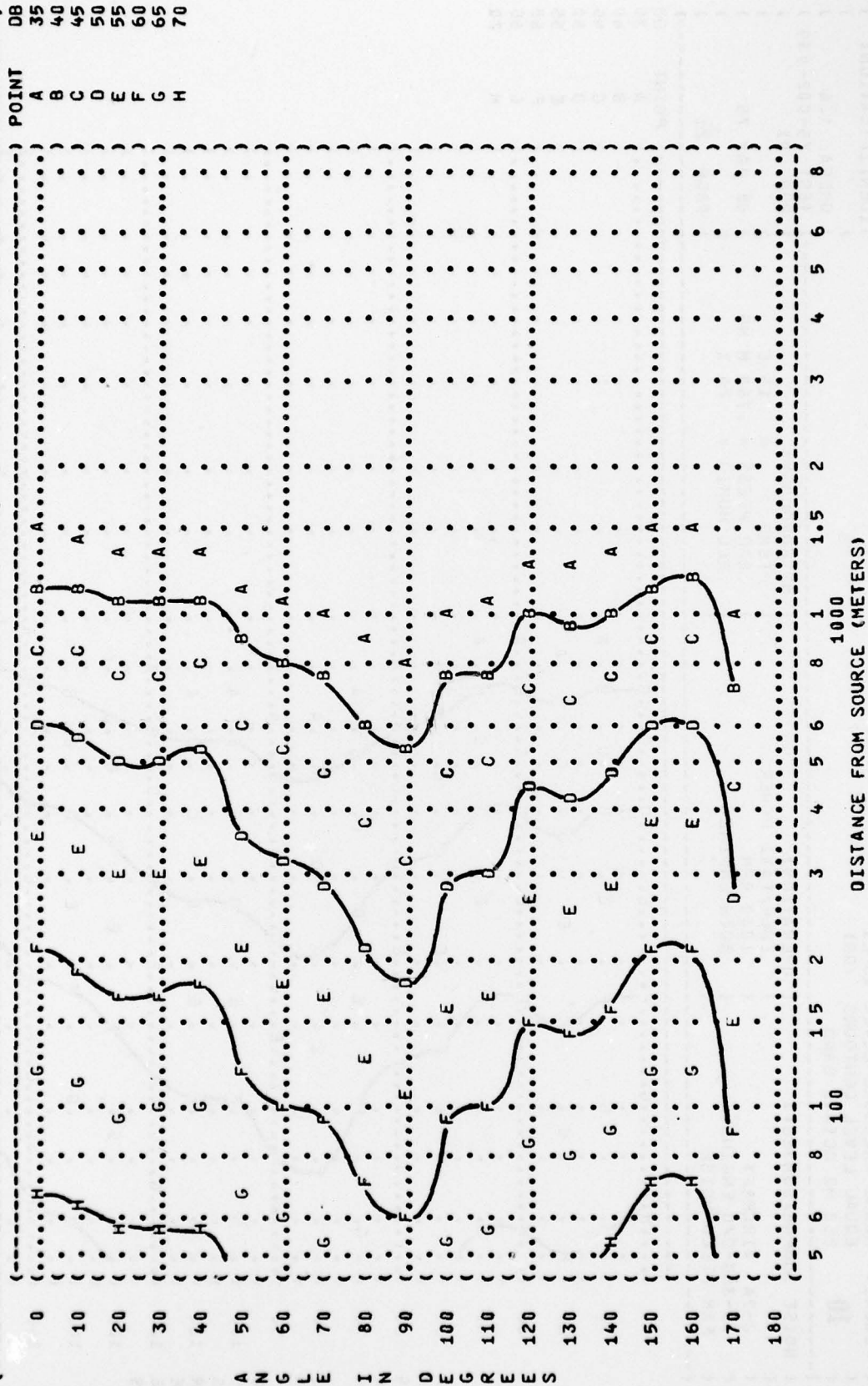


FIGURE:	SOUND PRESSURE LEVEL EQUAL LEVEL CONTOURS	(SPL)	IDENTIFICATION:
10	1000 HZ OCTAVE BAND		OMEGA 1.4
			TEST 75-002-039
			RUN 01
NOISE SOURCE/SUBJECT:	OPERATION:	METEOROLOGY:	
	IDLE/TAXI POWER	TEMP = 15 C	
0-2A AIRCRAFT	1000 RPM	BAR PRESS = .760 M HG	08 MAY 75
IO-360-C/D ENGINE	BOTH ENGINES	REL HUMID = 70 %	
FAR FIELD NOISE			PAGE 23

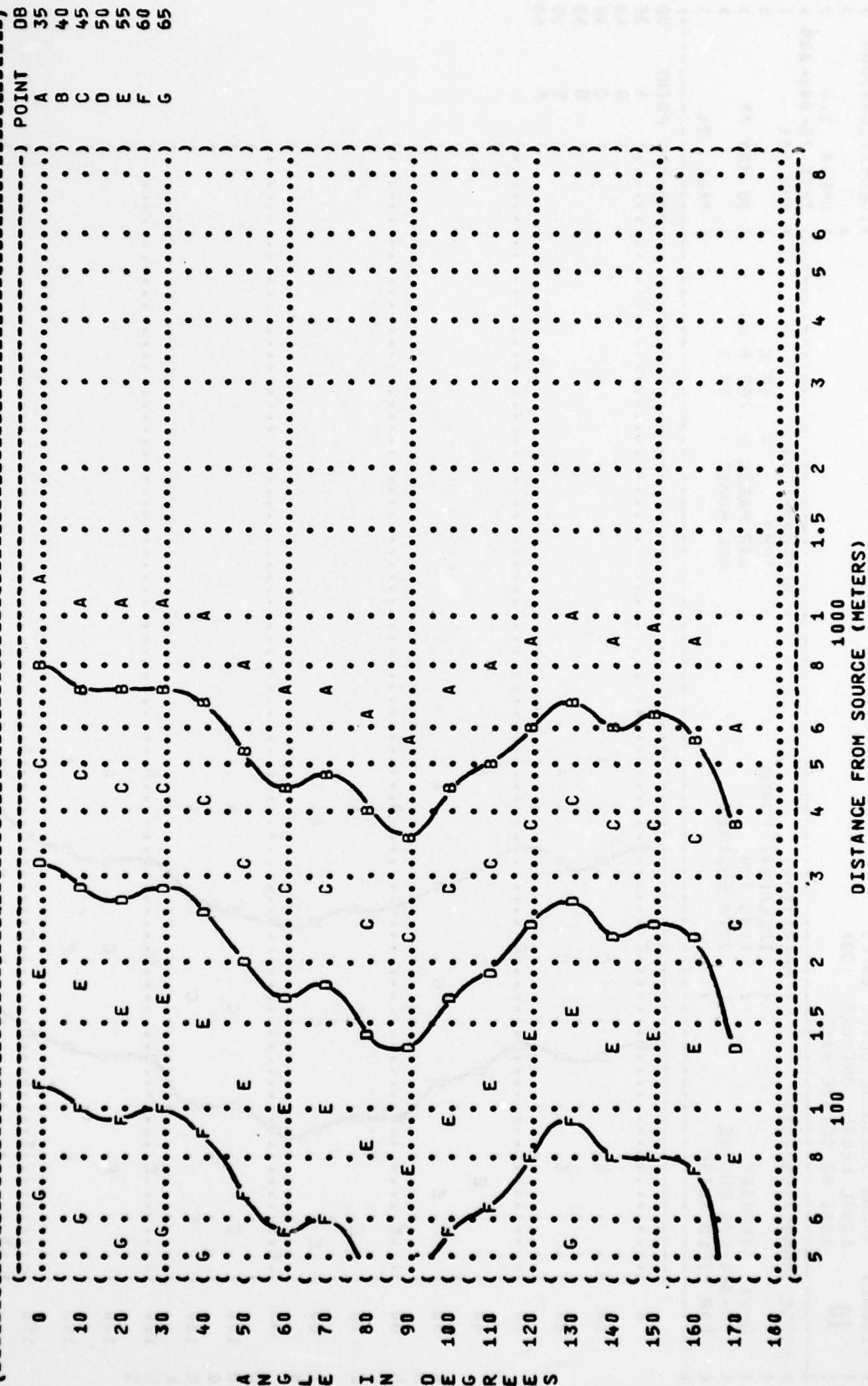
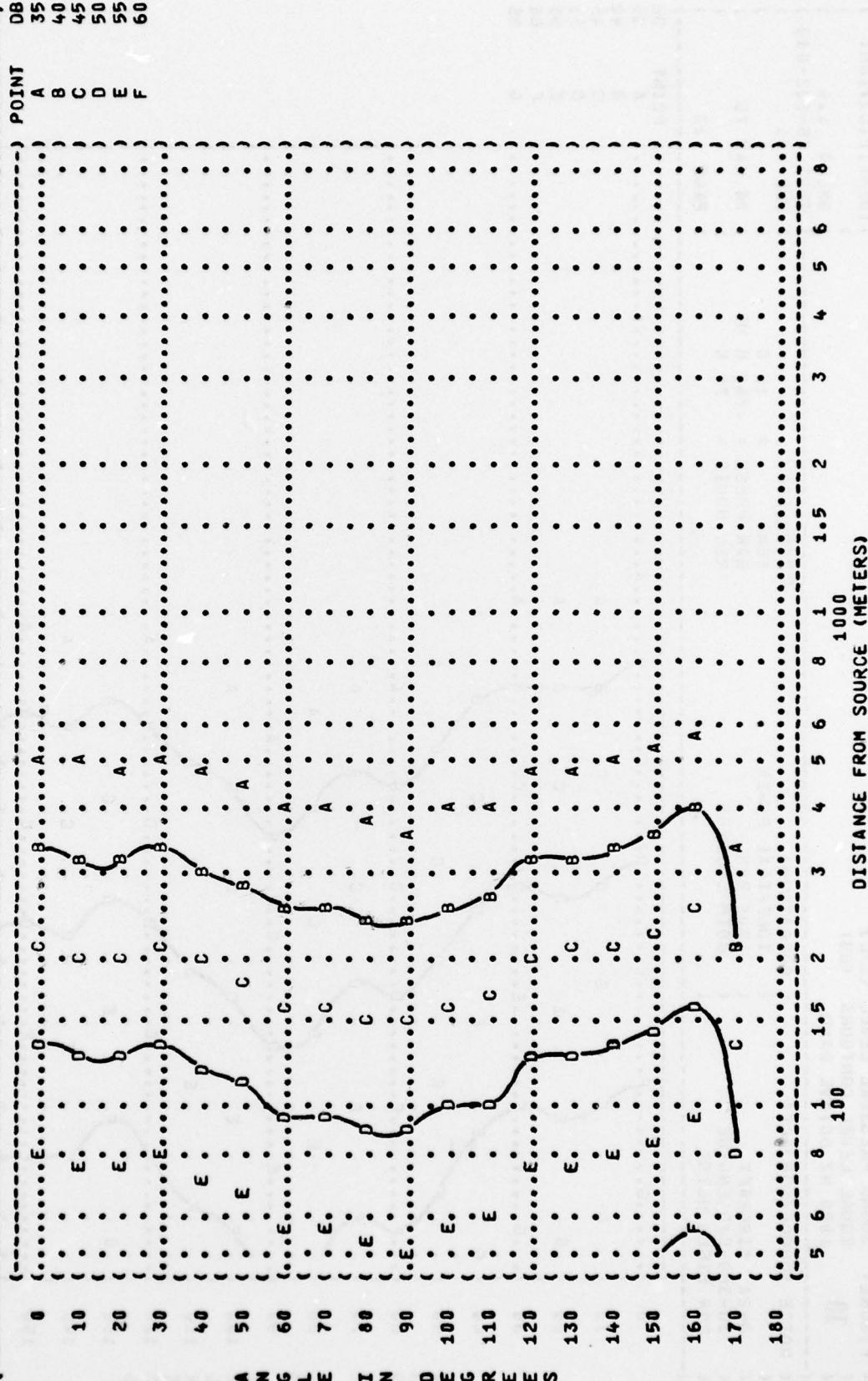


FIGURE: SOUND PRESSURE LEVEL (SPL)
 10 EQUAL LEVEL CONTOURS (DB)
 2000 HZ OCTAVE BAND

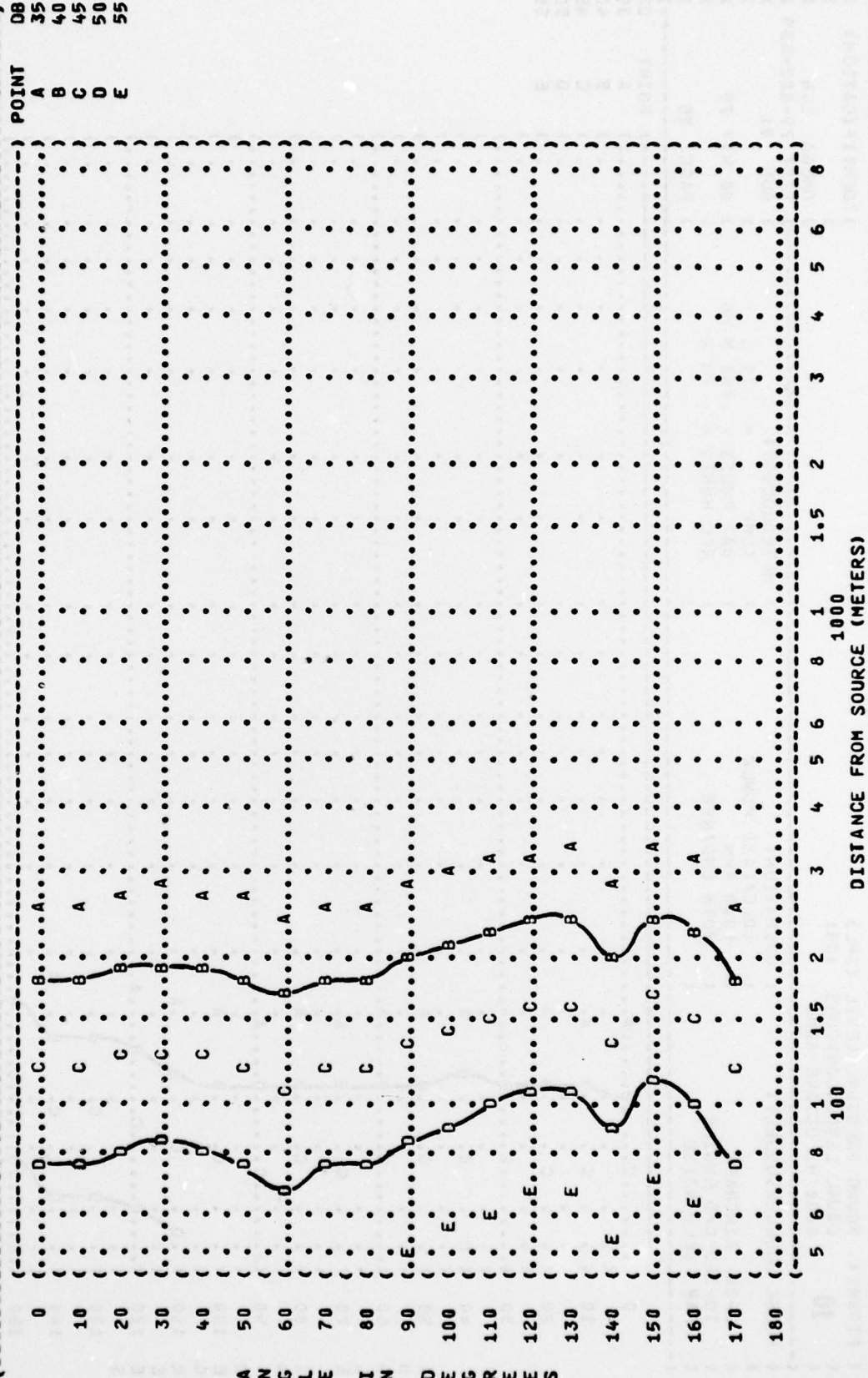
NOISE SOURCE/SUBJECT: OPERATION: IDLE/TAXI POWER
 0-2A AIRCRAFT (1000 RPM
 IO-360-C/D ENGINE (BOTH ENGINES
 FAR FIELD NOISE (

METEOROLOGY: TEMP = 15 C
 BAR PRESS = .760 M HG
 REL HUMID = 70 %

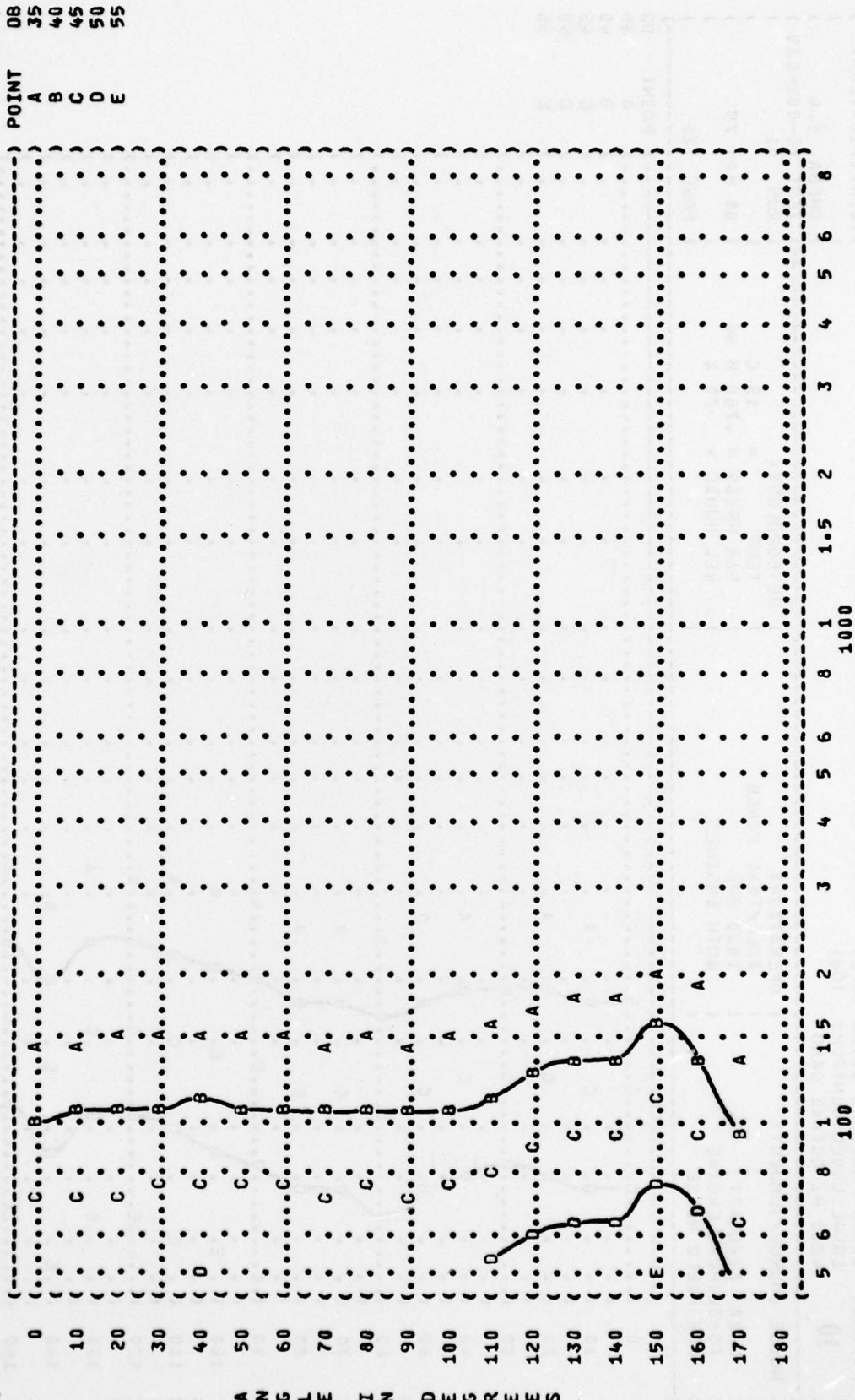
IDENTIFICATION: OMEGA 1.4
 TEST 75-002-039
 RUN 01
 08 MAY 75
 PAGE 24



(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 4000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION: (METEOROLOGY: (POINT DB
 ((IDLE/TAXI POWER (TEMP = 15 C (A 35
 ((1000 RPM (BAR PRESS = .760 M HG (B 40
 ((BOTH ENGINES (REL HUMID = 70 % (C 45
 (O-2A AIRCRAFT (((D 50
 (IO-360-C/D ENGINE (((E 55
 (FAR FIELD NOISE (((PAGE 25)

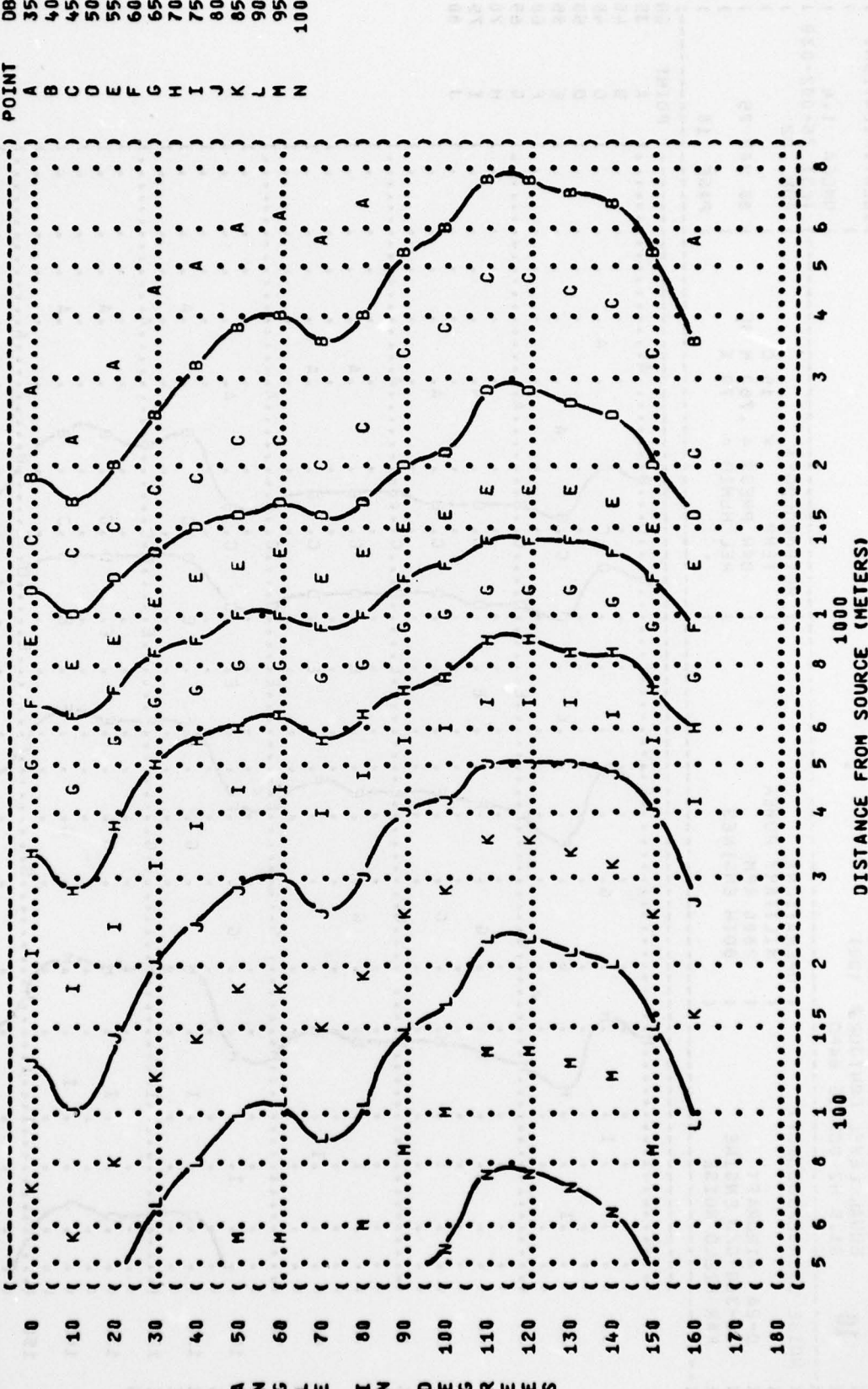


((FIGURE: SOUND PRESSURE LEVEL (SPL))
 ((EQUAL LEVEL CONTOURS (DB))
 ((10 8000 HZ OCTAVE BAND)
 ((NOISE SOURCE/SUBJECT:)
 ((OPERATION:)
 ((10LE/TAXI POWER)
 ((1000 RPM)
 ((80TH ENGINES)
 ((0-2A AIRCRAFT)
 ((10-360-C/D ENGINE)
 ((FAR FIELD NOISE)
 ((METEOROLOGY:)
 ((TEMP = 15 C)
 ((BAR PRESS = .760 M HG)
 ((REL HUMID = 70 %)
 ((IDENTIFICATION:)
 ((OMEGA 1.4)
 ((TEST 75-002-039)
 ((RUN 01)
 ((08 MAY 75)
 ((PAGE 26)
 (()



DISTANCE FROM SOURCE (METERS)

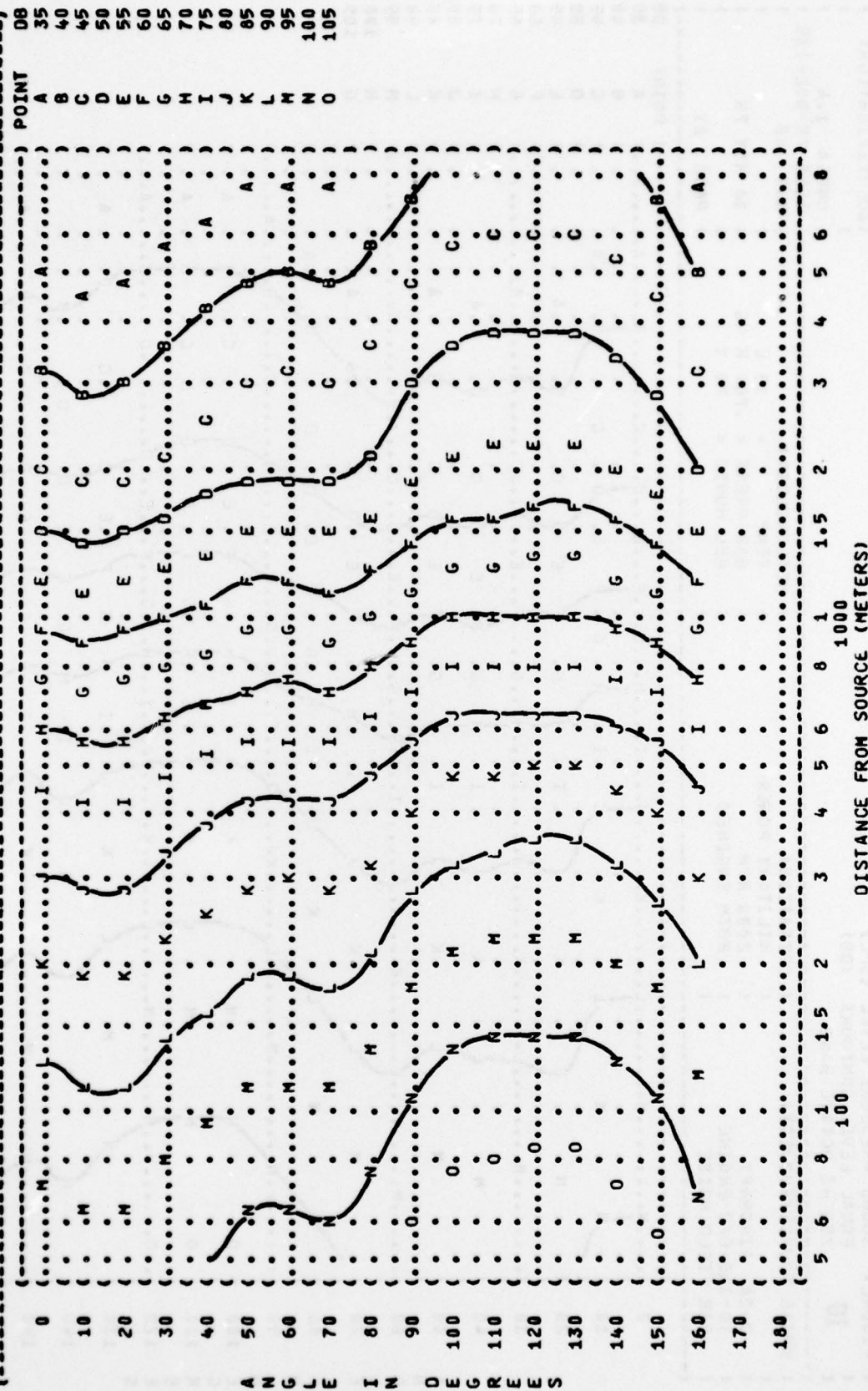
(FIGURE: SOUND PRESSURE LEVEL (SPL))
 (EQUAL LEVEL CONTOURS (DB))
 (10 63 HZ OCTAVE BAND)
 (NOISE SOURCE/SUBJECT:)
 (O-2A AIRCRAFT)
 (IO-360-C/D ENGINE)
 (FAR FIELD NOISE)
 (OPERATION:)
 (MILITARY POWER)
 (2800 RPM)
 (BOTH ENGINES)
 (METEOROLOGY:)
 (TEMP = 15 C)
 (BAR PRESS = .760 M HG)
 (REL HUMID = 70 %)
 (IDENTIFICATION:)
 (OMEGA 1.4)
 (TEST 75-002-039)
 (RUN 02)
 (06 MAY 75)
 (PAGE 19)



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(-----)
( FIGURE: SOUND PRESSURE LEVEL (SPL) ) IDENTIFICATION: )
( ( ) ) )
( ( 10 ) ) )
( ( EQUAL LEVEL CONTOURS (DB) ) )
( ( 125 HZ OCTAVE BAND ) )
(-----)
( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( ( OPERATION: ) )
( ( MILITARY POWER ) )
( ( 2800 RPM ) )
( ( BOTH ENGINES ) )
( ( ) )
( O-2A AIRCRAFT ) TEMP = 15 C )
( I0-360-C/D ENGINE ) BAR PRESS = .760 M HG )
( FAR FIELD NOISE ) REL HUMID = 70 % )
( ( ) )
(-----)

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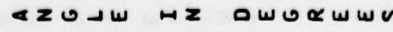
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0-2A AIRCRAFT
IO-360-C/D ENGINE
FAR FIELD NOISE

2800 RPM
BOTH ENGI

BAR PRESS =
REL HUMID =

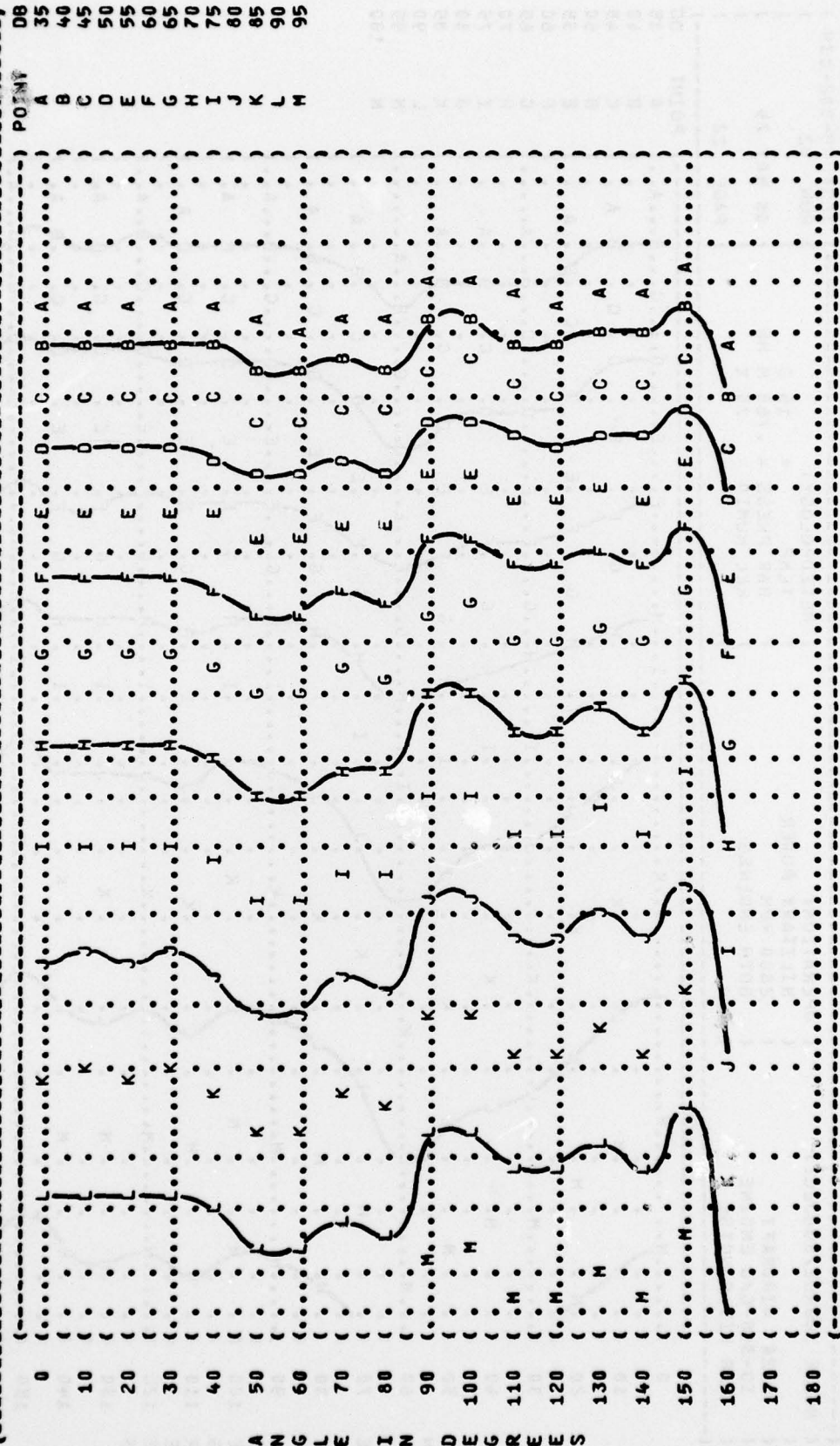
OMEGA 1.4
TEST 75-00
RUN 02
00 MAY 75
PAGE 21



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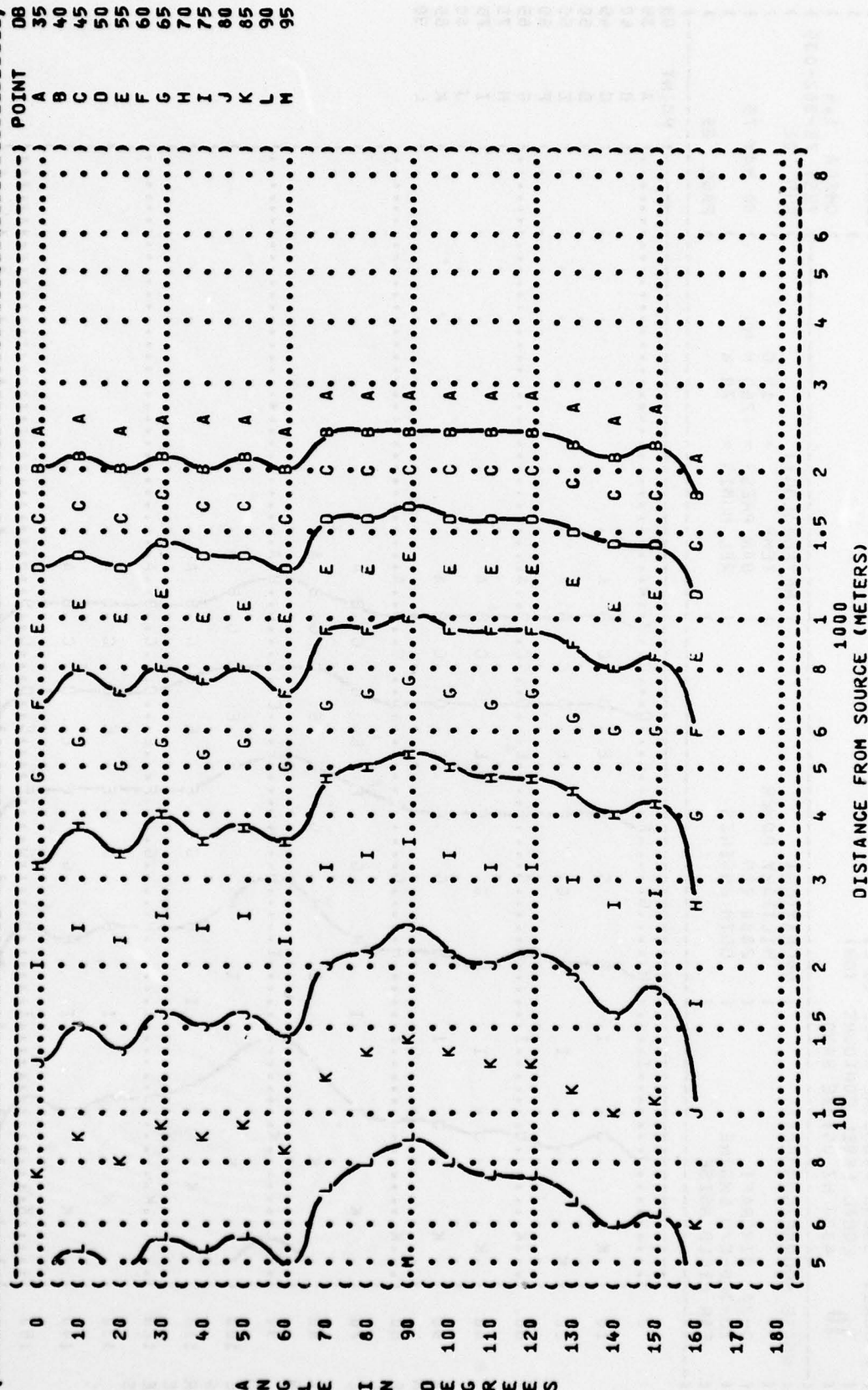


IDENTIFICATION:
 OMEGA 1.4
 TEST 75-002-039
 RUN 02
 METEOROLOGY:
 TEMP = 15 C
 BAR PRESS = .760 M HG
 REL HUMID = 70 %
 OPERATION:
 MILITARY POWER
 2800 RPM
 BOTH ENGINES
 NOISE SOURCE/SUBJECT:
 O-2A AIRCRAFT
 IO-360-C/O ENGINE
 FAR FIELD NOISE



DISTANCE FROM SOURCE (METERS)

(FIGURE: SOUND PRESSURE LEVEL (SPL))
 (10 EQUAL LEVEL CONTOURS (DB))
 (2000 HZ OCTAVE BAND)
 (NOISE SOURCE/SUBJECT:)
 (0-2A AIRCRAFT)
 (10-360-C/D ENGINE)
 (FAR FIELD NOISE)
 (OPERATION:)
 (MILITARY POWER)
 (2800 RPM)
 (BOTH ENGINES)
 (METEOROLOGY:)
 (TEMP = 15 C)
 (BAR PRESS = .760 M HG)
 (REL HUMID = 70 %)
 (IDENTIFICATION:)
 (OMEGA 1.4)
 (TEST 75-002-039)
 (RUN 02)
 (08 MAY 75)
 (PAGE 24)



ANGLES

IDENTIFICATION: OMEGA 1.4

9.4

METEOROLOGY:

TEOROLOGY: = 15 C
TEMP = .760 M HG
BAR PRESS = 70 %
REL HUMID

2800 RPM

BOTH ENGINES



1000
DISTANCE FROM SOURCE (METERS)

